CQ-TV MAGAZINE No. 139

BRITISH AMATEUR TELEVISION CLUB

AUGUST 1987

BBC
VIDEO TITLER AND DISPLAY PROGRAM
MSX

ATV SOFTWARE REVIEWS

BUILDING ATV REPEATERS

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MEMBERSHIP

FULL YEAR: £6 or £1.50 for each remaining quarter of the year. All subscriptions fall due on the first of January. Membership application forms are available by sending a stamped addressed envelope to Dave Lawton, whose address may be found on page-2 of this magazine.

OVERSEAS MEMBERS are asked to send cheques bearing the name of the bankers London agent. Postage stamps are not acceptable as payment. Overseas airmail is extra - please enquire from Dave Lawton or see the rates list printed in the most recent 'November' issue of CQ-TV.

The British Amateur Television Club is affiliated to the Radio Society of Great Britain and has representatives on the committee of the European Amateur Television Working Group.

The BATC is registered under the DATA PROTECTION ACT, all queries to Dave Lawton.

CQ-TV is produced by the British Amateur Television Club as its official journal and is sent free to all members. It is not for general sale.

Articles contained in CQ-TV magazine may be quoted by non profit-making organisations without prior permission of the Editors, provided both the source and author are credited. Other organisations may obtain permission in writing from the Editor

The BATC maintains many pages of news and information associated with amateur television on the Prestel Information Service. Club pages may be found within the ClubSpot section and full details were last published in CQ-TV 134. Copies of the article (two pages) may be obtained from the Publications department.

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CLOSE FOR PRESS DATE FOR THE NOVEMBER ISSUE.......September 20th

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NEED ANY HELP?

Members of the BATC committee are available to help and advise club members on any ATV related subject. Remember that all such work is done in their spare time so please try to keep such queries to a minimum.

GENERAL CORRESPONDENCE - Club affairs; video tape library; technical queries, especially related to handbook projects: TREVOR BROWN G8CJS, 14 Stairfoot Close, Adel, Leeds 16. Tel: (0532) 670115

MEMBERS SERVICES - PCB's; components; camera tubes; accessories etc. (other than publications); queries related to such supplies: PETER DELANEY G8KZG, 6 East View Close, Wargrave, Berkshire RG10 8BJ. Tel: (07352) 23121

MEMBERSHIP - Anything to do with membership including new applications; queries and information about new and existing membership; change of address; non-receipt of CQ-TV; subscriptions; membership records; data protection; Prestel: DAVE LAWTON GOANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD: Tel: (0494) 28899

LIBRARY - Any queries relating to the borrowing or donation of written material to the BATC central library. PAUL MARSHALL G8MJW, Fern House, Church Road, Harby, Nottinghamshire NG23 7ED: Tel: (0522) 703348

PUBLICATIONS - Anything related to the supply of BATC publications. CQ-TV back issues and other publications are normally only available if listed on the Publications order form at the centre of this issue: IAN PAWSON G8IQU, 14 Lilac Avenue, Leicester LE5 1FN. Tel: (0533) 769425

EXHIBITIONS AND RALLIES - also arrangements and information about lectures and talks to clubs; demonstrations etc: SITUATIONS VACANT - any volunteers are asked to contact Trevor Brown.

CLUB LIAISON - and anything of a 'political' nature; co-ordination of ATV repeater licences: GRAHAM SHIRVILLE G3VZV, The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF. Tel: (0525) 25343

TVI & RADIO INTERFERENCE - any problems of this nature please to: Les Robotham G8KLH, 38 Ennerdale Avenue, Stanmore, Middx. HA7 2LD (not committee).

CQ-TV MAGAZINE - Anything destined for publication in CQ-TV magazine (except regular columns) or forthcoming BATC publications. Articles; review items; advertisements; other material; queries on the content of past issues.
EDITOR: JOHN WOOD G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: (0788) 69447 -
ASSISTANT EDITOR: MIKE WOODING (see next item).

CONTESTS & AWARDS, CQ-TV ASSISTANT EDITOR - Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF Tel: (0788) 890365.

Where possible it is better to telephone your query rather than write. Please do not call at unsocial hours. As a guide, try to call between 6.30 and 9.30pm evenings and not before 11am at weekends.

EDITORS POSTBAG

Dear Ed,
G3WCY and G4ENA are to be congratulated for their work on furthering SSTV by showing in CQ-TV and RadCom that it IS possible to build ones own FSTV/SSTV and SSTV/FSTV converters. For a long time I read CQ-TV and saw a lot of articles and letters about Robot equipment which seemed to get excessive exposure (yes I know there is not much else for those who want the latest SSTV black box to buy), but at times CQ-TV gave the appearance of a Robot advertising broadsheet! I think that, like myself many were put off SSTV when they saw intimated that it would cost £300+ to get going properly on SSTV.

Fortunately, the appearance of the 'WCY and the 'ENA along with computer systems have opened SSTV cheaply to many who otherwise would not have bothered.

Dave Robinson G4FRE

For many years CQ-TV was able to get very little material on SSTV, either on home brew or commercial gear. Because of that we had a lot of criticism from members and more active steps were taken to assemble a reasonable amount of SSTV material.

Obviously I can only publish what I receive and, if Messrs Robot (U.K.) Ltd, (with whom I have NO connection whatsoever) kindly help out by taking advertising space, supplying copy on the commercial side of SSTV AND a great deal of assistance with 'The Slow-Scan' Companion', then I am certainly not going to turn it down. We therefore make no apology for using such material in CQ-TV.

Might I suggest to members that if they wish to see more on certain topics they try to do something about it, even if only to put the suggestion to the Editors. That way we shall know what you want and can then set about supplying that need. Ed's.

Dear BATC,
I would like to know if there are any TV amateurs in the Ross-Shire/Inverness area as I would like to be able to receive their pictures on 70. At present I am not operational on 70 but hope to be so soon.

P.West.
2 The Cottage,
Udale Farm,
Poyntzfield,
Ross-Shire,
IV7 8LY

Dear BATC,
Could you please let me know about any BATC members in my area so that a beginner may obtain information about antennae suitable for this area of Scotland, before I spend money foolishly!

M.Block,
37 Clepington Road,
Dundee,
Scotland.

These letters are typical of some which are regularly received by the BATC. Unfortunately, due to the restrictions placed upon us by the Data Protection Act, we are unable to divulge member's personal information to a third party. Members with similar enquiries may like to send their request to CQ-TV for publication in this column.

Dear Ed,
In response to my advert for a plug-in remote control unit for the Ferguson 3V16 VCR in the May edition of CQ-TV, I received, anonymously, both a remote control unit plus the operating manual.

I would like to thank the person responsible very much indeed for his (or her) kindness and ask you to contact me, as I should like to thank you personally.

George Mayo, G4EUF (QTHR)

Dear Ed,

I would refer to Roy Humphrey's reply to my letter regarding 10GHz band planning and usage, as it contains several misconceptions.

First, may I say that the "Microwave Society" has no connection with the RSGB and the RSGB Microwave Committee. It therefore has no direct part to play (their own words) in the "organisational side of the hobby": their aims and interests have been stated to be "to get on with the job of helping newcomers to get on to the bands" - 10 and 24GHz, that is.

By contrast, the RSGB Microwave Committee (in conjunction with, particularly, the RMG and LAC) has responsibility for ALL microwave bands, planning, development, standards, repeaters, beacons etc. at both national and international levels. I would hope that other microwave user groups such as the Microwave Society, BATC and AMSAT will help us in this task by feeding back information and aspirations as do the two other committees mentioned above.

The Microwave Society's "advice" on the use of 10.4GHz for WBFM appears to have been given incorrectly - it WAS agreed for speech modes (25 to 150KHz deviation), but never for FMTV.

As to the 10GHz "bandplan" - it was not in existence at the time that the VHF/UHF Manual was written, although it has been displayed as a tentative plan at many RSGB functions for several years now. The reason why it was never published widely is that it is a "domestic", ie. U.K. plan, which has not yet received official or international approval: it should be pointed out that widely published bandplans have generally been those agreed within IARU Region-1 societies and administrations, with the exception of 50 and 70MHz which are peculiar to the British Isles. I hasten to add that the present bandplan has arisen from usage rather than by active planning as such.

Now, however, there is a good reason why I stressed the "non-interference" aspect of the use of 10.4GHz: Mercury Communications are "channelising" 10.3 to 10.4GHz for commercial link use and, as PRIMARY users, they have every right to do this and expect interference-free use. Keeping the international narrowband segment at 10.368 to 10.370GHz will not cause any embarrassment, as signal frequencies are known and maintained to within a few KHz of nominal. Furthermore, the transmission bandwidths are restricted to, at most, a few KHz. Whilst I agree with Roy that interference is unlikely it is, nevertheless, possible. For this reason the licencing of such equipment as repeaters and beacons in this area of the band has been suspended until agreement has been reached between the DTI and Mercury on what frequencies are to be used and the possibility of interference has been fully assessed.

Under these circumstances, coupled with inaccurate frequency measurement and poor frequency stability (yes, I know that in theory we only need measure to 2% within the band!), there is no way that 10.4GHz could be recommended for FM-TV - even speech is a little tongue-in-cheek! All the modules in common use will tune down to at least 10.1GHz, so there are no problems in that respect.

Be aware that similar considerations are likely around 24GHz in the not-too-distant future. This time the potential users are TV broadcasters. So the biter is bit!

Mike Dixon, G3PFR.

Dear Ed,

The West country is filled with all types of traditional things like the May Queen, Cornish Pasties (pronounced past tees), Cornish Cream, the Padstow Hobby Horse and the Floral Dance, but spring also brought Grant (G8CGK) and Mrs.Dixon. It was a joy to see them both.

Grant bought along his weathersat gear for me to see and left it for me to play with for a while. I must now admit that I became hooked on watching and preparing for the orbital passes, viewing on the monitor and the like. The detail was marvelous, the grey-scale excellent and I was thrilled to watch it all. The aerial seemed a simple affair although it worked very well indeed. It all reflects great credit on Grant for his excellent construction project.

I had a detailed report of the BATC show at Crick this year and was sorry not to have been there and Grant brought gifts from afar (from the BATC stand), thanks to all.

Grant is one of the original SSTV experimenters who has progressed now into computers and satellites; long may he continue to support us home brewers.

May I also take this opportunity to thank Peter Major for his help recently with some spares I needed.

Johnny Brown G3LPB.

Dear Ed,

Just a note to let you know how much the articles "Scanning and Syncs" and "Satellite TV News" were appreciated here in West Germany.

We have recently purchased a new house here which has the infamous 'cable' connected. The German postal authority is trying to push cable TV by automatically connecting all new dwellings to the network, promising super quality stereo sound and a much improved picture. The only advantage we've found is being able to receive Super Channel and Sky Channel which, apart from being in English, provides an excellent selection of entertaining programmes. The Super Channel news programme is eagerly awaited at 10pm every weekday evening.

Being a licenced amateur I would have preferred to have either built or purchased (kit wise) satellite receiving equipment myself, but the Bundespost informed me that this is only permitted if cable facilities are not to be available earlier than six months hence. That rather stifles the old initiative!

I look forward to more articles on SSTV projects, particularly any involving the use of the C-64 computer. I have a few programs pertinent to amateur radio such as; colour test card with scrolling callsign, QTH locator etc.

Keep up the good work!

Allan Sancto, DD5FM,G6BWH.

Dear Ed,

May I use your postbag to say "thank you" to two good friends; Viv G1IXE and her husband Iver G1IXF, of Bristol, who gave their time, effort and financial help to me when I was in trouble with TVI whilst transmitting ATV recently. Their practical sympathy was tremendously appreciated when the problem seemed insurmountable, as I was still a very new devotee to ATV.

In Bristol we have a growing number of interested people who welcome a newcomer into their midst and I particularly wanted my appreciation to be made public, so that everyone in our area will find the above two friends so willing to help. I hope in future to pass on to others all I have learned from Viv and Iver.

May I take this opportunity of saying how I look forward each quarter to CQ-TV dropping through my letter box, it's always a mine of information. Of particular interest was the CQ-TV index with the May issue, that was great.

I would ask most sincerely to keep the format of "our" CQ-TV the same as it is at present, so easily handled when snoozing at the same time!!

Mrs. Jean Fletcher G0AWX

Dear Ed,

Having just got back on the air again I would very much like to arrange some skeds with TV amateurs. If anyone is interested they can phone me on (0773) 604965.

I am also looking for a program for the Dragon 32 for film titling etc and would be delighted to receive any such information.

James Stokes, G6XMY,
Somercotes, Derbyshire.

Dear Ed,

I would like, through the pages of CQ-TV, to express thanks to all those directly, or indirectly who have got the local ATV repeater GB3UD on the air. I name particularly G4DVN and G8KUZ - well done all.

Chris Barker, G1EZJ

NEWS ROUNDUP

ASTEC TVRO MODULES

Unfortunately Comex Systems Ltd are no longer able to supply Astec modules, nor in fact any of their previously advertised products. The firm ceased trading in April.

To the rescue comes another supplier who stocks both the tuner and demodulator modules and is only too pleased to supply them to members.

Satalite TV Services, P.O.Box 26, Worksop, Nottinghamshire S80 1XW. Tel: (0909)722437. The firm exhibited at this year's show and was situated next to the bring and buy and, as reported in the last issue, they stock a comprehensive range of satellite TVRO equipment.

FREE GOODIES AT THE BATC STAND - NOTES

As reported last time a quantity of NEW surplus equipment was donated to the club on the understanding that it was distributed amongst members at a nominal cost only to cover expenses. Some notes on their use have been sent in which may be useful:

ZOOM LENSES: G8WGD advises that if pins 1 & 2 of the control plug are connected to a 9v supply, the iris opens fully and allows the lens to be used at full aperture.

ELECTRONIC VIEWFINDER: G8DLX provides us with a list of the pin numbers together with their wire colour codes. These colours are particularly useful as most of us will have to remove the plug in order to fit another, more obtainable type. In some cases the colours CHANGE after entering the viewfinder housing:

1	Brown	Remote switch
2	Red	'V' light
3	Orange	Video in
4	Yellow	+12v
5	Blue*	'L' LED
6	Grey*	'B' LED
7	White	Ground - 0v
8	Black	Zoom lens control

*ground to operate

TV SATELLITES?

The January issue of QST magazine carried an article describing a new era in OSCAR amateur satellite history.

An engineering study plan has been completed for a TWO-satellite geosynchronous system which AMSAT believes could be in service by 1991-1992.

Designated Phase 4, AMSTAR East would be positioned over the equator at 46.6 degrees west where it would cover everything east to Helsinki and Durban and west to Seattle. AMSTAR West would cover everything from Boston west to Tokyo and central Australia. The article suggests that, although technically difficult, it may be possible to interlink the two satellites (crosslink) in such a way as to enable a two-satellite QSO from (say) Athens to Melbourne.

Of particular interest to TV'ers is the fact that these satellites will probably carry a transponder which could handle fast scan TV signals, albeit using some form of digital compression technique. Apparently commercial and military developments are proving so successful in this field that the technology is confidently expected to be available to amateurs by the early nineteen nineties. A tentative digital video data rate is perhaps 500 Kbits/S.

Thanks to G8ONX for this report.

WHERE'S MY ARTICLE?

If you have sent an article or other material for inclusion in CQ-TV, and it has not yet appeared, please bear with us. You see we have been getting a great deal of copy recently and there is just not room for it all! It's a super situation to be in for us but I can't help feeling that some of you will be disappointed not to see your material in the next issue. Rest assured that almost everything will be used, however, in order to maintain a reasonably balanced magazine some items just have to be held over till a later issue. Do please keep all that information coming though and may we (Mike and myself) express our sincere thanks to all those who send items to CQ-TV.

WIPE GENERATOR

The new wipe generator printed circuit board is now available. Based on the circuits in the Revised Amateur Television Handbook, it comes with a set of notes and ideas on adjustment etc. The present board enables horizontal and vertical barndoors, horizontal, vertical, diagonal, diamond, circle and other wipes, and cross fades to be created on the BATC mix effects amplifier and similar systems. The board is designed to accept an add-on board to create multiple, gated or reverse wipes, details of which will be given in CQ-TV when it has been developed.

CATALOGUE RECEIVED

A useful catalogue, just received, is from Video Orderline, formerly known as Comprehensive Video. The list includes many difficult to obtain specialist video connectors and adaptors and multicore camera cable by the metre. Amongst the other items are lighting, test charts, tapes, books, cleaning fluids... and a can of artificial cobwebs! The address is 565 Kingston Road, London SW20 8SA, tel 01-542-1171, and there is no minimum order value.

TV TRANSMITTERS NEED LICENCES

To many of the members of BATC, who began as radio amateurs, it is well known that it is essential to obtain an amateur radio licence before making or constructing a transmitter. It would seem, however, judging by some of the questions that are sometimes asked, that some members whose interest in amateur television was generated by another route are not aware of this. In the U.K., this entails passing the Radio Amateurs Examination first. Details of courses and the RAE should be available from your local amateur radio club, or from the RSGB, Lambda House, Cranborne Road, Potters Bar, Hertfordshire. Those who operate a transmitter without the proper licence risk prosecution and confiscation of all the equipment in use.

CQ-TV FORMAT

I seem to have raised some dust recently when I asked, innocently enough, what you thought of CQ-TV being increased to a larger format.

I have to say that I have been deluged with letters, phone calls and lobbying over the air, almost all in favour of keeping the size as it is. I've had long letters extolling the virtues of the small format right down to a single sheet of paper which simply said "Hands off our CQ-TV" right in the middle. One member said (in the nicest possible way) that if we went A4 then he would roll it up into a tube and do something almost impossible with it!

Ok then, I was just asking. You know me, I'll try any excuse to indulge my journalistic and artistic(?) aspirations.....Get on with it ed...

MEMBERS SERVICES

BATC Members Services does not hold stocks of BATC publications, and vice versa. Please send your order to the appropriate address, as otherwise extra delay and expense is caused in fulfilling an order. Several members have been making payment by open postal order - please, for your own security, send a crossed postal order or cheque payable to BATC.

Batches of callsign badges are sent to the engravers once per magazine cycle. Please ensure that your order reaches BATC Members Services by the CQ-TV close for press date, given at the foot of the 'contents' page in each issue. Badges are distributed to members as soon as they have been engraved.

If you require a special 'C' mount, such as for a lens turret, please write to Members Services with a drawing of your requirements.

Some new boards are in preparation, and will be announced on the BATC Prestel pages, if you can't wait for the next CQ-TV that is.

PRESTEL CHANGE

Prestel have recently instituted a new keyword system which is designed to provide easier access to the various areas within the service.

The system is based on a series of keywords relevant to the particular area of interest. For example: *BATC will take you straight to the BATC pages, *TV will tell you what's on TV, likewise *RADIO etc. Each keyword must be prefixed with an asterisk. Of course, you can still use the numbers as before.

HELP PLEASE!

Now a plea from Grant Dixon G8CGK: "Will the person who sold me a Spectrum computer at the Convention at Crick please get in touch with me. He included the manual for the Microdrive instead of the computer manual and he also may be requiring the microdrive interconnection plug which was in the box". Grant Dixon, G8CGK...Tel: (0989) 62715.

LOCAL OSCILLATOR SOURCE

On page 19 of the last issue I mentioned a crystal controlled local oscillator design by the RSGB. G3PFR advises that a printed circuit board for this project is now available through the Microwave Committee Components Service at £3.25 plus postage. Orders to RSGB headquarters please.

G3PFR also advises that a matching amplifier board is to be added to the project to bring the power up to something like 200 to 500mW, this is especially useful for higher microwave applications.

10GHz ATV WORKING FREQUENCY

Because of the number of stations using the 10GHz allocation for ATV work, the BATC and the RSGB Microwave Committee wish to propose a spot frequency for ATV use.

The frequency, at 10.250GHz, is right in the middle of the current wideband section of the common usage bandplan published in CQ-TV 137 (p48).

Although the BATC recommends this frequency for ATV working, it in no way seeks to prevent operation elsewhere in the band. We do ask though that you observe the bandplan in order to avoid the possibility of interference problems with other services. G3VZV or myself (ed) would be pleased to receive feedback on this suggestion.

DXPEDITION TO GW

The 'G8LIR' contest group are planning a mini-expedition to the Welsh mountains, probably in August. Any DX stations, particularly from the continent, who would like to arrange skeds should contact Ron Bentham, G4SHC, 144 Middleton Road, Hopwood, Heywood, Lancs OL11 2LU.

TV REPEATER ON 13cm?

A copy of a 'letter on intent', addressed to the RSGB, has been received by the BATC. This letter, from the Worthing Video Repeater Group, advises that they are considering making a proposal for a 13cm ATV repeater to be co-sited with the existing GB3VR station at Brighton.

Good luck chaps. Could this be the first step towards interlinking?

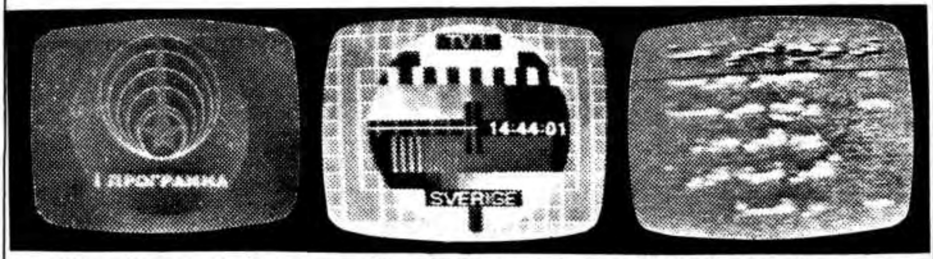
DX·TV CONVERTER

with WIDE and
NARROWBAND
I.F. SWITCHING

Model **D100**

COVERS BANDS I, III & UHF

Only 180mm x 120mm x 90mm approx.



From May until September, Sporadic-E ionisation affects Band I frequencies between 40 and 70 MHz. Watch its fascinating effects by viewing TV pictures from Europe and even further afield. Countries logged last year included Russia, Poland, Czechoslovakia, Hungary, Yugoslavia, Rumania, Iceland, Norway, Finland, Spain, Italy, Portugal, Switzerland, Austria, Denmark, Sweden, Morocco, Tunisia, Jordan, etc., etc.

Interested? For further details send 52p in stamps (refundable against first purchase) and we'll send you a copy of our DX-TV starter guide which discusses the hobby of long-distance TV in general, the pros and cons of narrowband DX-ing, propagation and the much acclaimed D-100 DX-TV Converter system. We'll also send details of our latest range of publications.

We can also supply the latest book by Roger Bunney ('A TV DXers Handbook') at £5·90 including P&P (UK only). Also available is 'TeleRadio News' at a subscription rate of only £6·00 (UK only) for 6 bi-monthly issues. Details of export prices for all items available upon request.

HS PUBLICATIONS

7 EPPING CLOSE DERBY DE3 4HR ENGLAND

REVIEW - REVIEW - REVIEW - REVIEW - REVIEW - REVIEW - REVIE

ATV SOFTWARE

By John Wood G3YQC
& Mike Wooding G6IQM

Despite there having been a regular 'Software Notebook' in recent issues, CQ-TV has not carried very much computer material with TV applications. Now however we have come across some software which could prove most useful in a TV station, so let's have a look at what's on offer. The first is slightly unusual and should prove of great value to designers and home-brewers alike.

AMP-CALC (for BBC-B, OS1.2)

AMP-CALC is a suite of programs that allow calculation of the static (DC) conditions for three types of class-A (linear) transistor amplifiers. It does NOT take account of dynamic performance conditions (the stray reactances associated with all electronic components), and so cannot predict frequency response and impedance - for this an AC performance analysis program is required. The programs come in either cassette tape or 40-track 5.25" disc versions.

The suite of programs forming this package comprises:

CE-AMP - Common-emitter amplifier
CB-AMP - Common-base amplifier
FBPAIR - Complimentary feedback pair
POTDIV - Potential-divider calculator
LCX - Reactance calculator

The disc version is "booted" by pressing SHIFT-BREAK whereupon a menu is displayed, the required program is selected by depressing an appropriate red function key. This menu facility is of course not available on the tape version where each program must be loaded separately.

AMPLIFIERS

In the case of the amplifiers, each program asks the user if he/she wishes to calculate components or performance. The idea of this is that the user may enter the required performance from which the program will calculate component values, or enter existing component values to discover an amplifier's performance. The three amplifier circuits covered are those most often found in audio, video and RF designs, all of which are used extensively in CQ-TV magazine.

Both the common emitter and common base programs can calculate using either PNP or NPN transistors. The common emitter and feedback amplifiers both have the circuit drawn on the screen and the input information and calculations are displayed alongside. The common base screen does not have its circuit drawn until the inputs are typed onto the screen (as answers to specific questions). After the program has made its calculations the circuit and results appear together. The photo's show the general appearance of the screens.

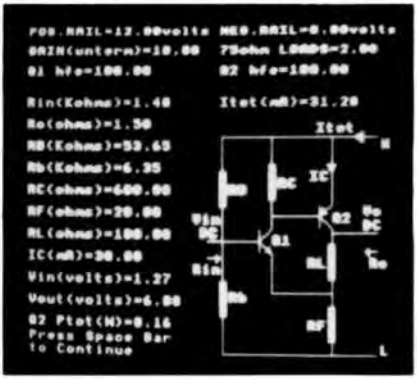
POTENTIAL DIVIDER

This program calculates resistance or voltage for two-element potential divider networks. The user is asked if resistance or voltage is to be calculated. If resistance is to be calculated it is also necessary to enter a value of current flowing through the chain.

Networks of more than two resistors may be tackled by combining the resistors, and then using the program more than once. This program is invaluable for determining the resistors required to restrict the tuning range of a varactor controlled TV tuner.

REACTANCE CALCULATOR

This program is included in the suite so that suitable coupling capacitors etc can be calculated if the amplifiers are to be AC-coupled. Inductive reactance is also included. According to the documentation this program takes no account of the 90-degree phase-shifts that occur between voltage and current when purely reactive elements are present in the circuit. This means that resistances and reactances cannot be simply added and subtracted in such networks.



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POS.RAIL=12.00volts NEG.RAIL=0.00volts
GAIN(unterm)=10.00  75ohm LOADS=2.00
Q1 hfe=100.00       Q2 hfe=100.00

Rin(Kohms)=1.40     Itot(mA)=31.20
Ro(ohms)=1.50
RB(Kohms)=53.65
Rb(Kohms)=6.35
RC(ohms)=600.00
RF(ohms)=20.00
RL(ohms)=100.00
IC(mA)=30.00
Vin(volts)=1.27
Vout(volts)=6.00
Q2 Ptot(W)=0.16
Press Space Bar
to Continue
```

The 'Complimentary pair' screen

DOCUMENTATION

There are several pages of documentation with this package, although its main purpose it to guide the user through the more technical aspects of the circuits under consideration. After a first run through the user will not normally need to refer to the documentation to make ordinary calculations, since the program prompts and graphics are quite self-explanatory. The various descriptions and circuits in the documentation do however, enable the user to get the most from each program by explaining in some detail the circuit operation and its variations. The programs therefore may also be considered as a good instrument of learning.

CONCLUSIONS

John Goode is well known for his video articles in CQ-TV magazine and may certainly be considered as something of an expert on the subject. Therefore you may be sure that technically all programs are accurate. The use of a menu (disc version) is very useful and the title screen is pleasing to the eye, although not elaborate. It does, however, make program selection very easy indeed.

The program is a little inconsistant in that some questions, when answered, automatically execute whereas others need a press of the RETURN key to execute. This latter though is mostly when inputting circuit constants and therefore was probably included in order to retain the opportunity of changing an input before passing it to the program.

Error trapping is reasonable although on occasions the programs will accept characters from the keyboard other than those normally expected. It is not until the final calculation is made though that the 'error' is noticed whereupon the program aborts and goes back to the start screen. Although this may be considered undesirable in a commercial program, John does advise that, due to the fact that much of the memory is taken up by a large number of variables, there is just not enough left to accommodate the many instructions needed to make it 'idiot proof'.

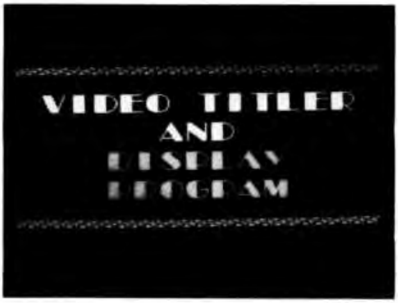
The programs are written in BASIC and their execution is rapid. There are no embarrassing pauses whilst the computer sorts itself out.

At £10.00 for the disc and £8.00 for the tape (including post - overseas extra) I consider this package to be good value for money and absolutely invaluable in a TVer's shack - recommended.

AMP-CALC is available from;
John Goode, 58 Linden Crescent, St.Albans, Herts AL1 5DD.

VIDEO TITLER & DISPLAY PROGRAM - MSX

This package by Anglosoft and Memory Video is a sophisticated program for the MSX computer, which enables the creation of single titles or a sequence of titles and governs their display by software control.



VIDEO TITLER
AND
DISPLAY
PROGRAM

The package is aimed at semi-professional small-unit studios and therefore has been written with their needs in mind. For amateur use of course this is ideal since it affords the amateur the facility to produce professional quality titles, display them in any desired timing sequence (ideal for video dubbing) and, with certain models of computer, enables their superimposition over an existing 'through' picture as well. This latter facility is available on the Pioneer PX-7 computer which also has stereo sound and various screen wipes available.

The program is available on either cassette, 'quick disc' or standard 3.5" disc. The software comes neatly packaged in a smart plastic custom case which contains the disc (or tape), a 20-page user's manual and a card detailing the large number of block graphics and picture shapes available within the package.

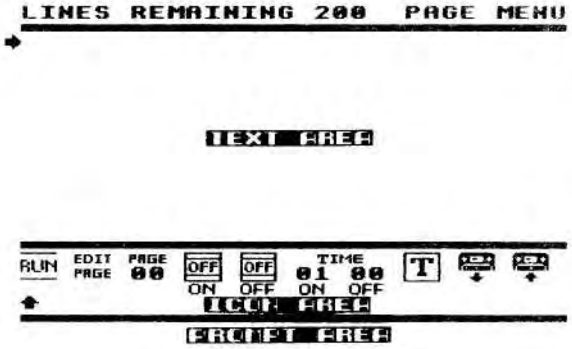
The Pioneer PX-7 A/V computer system has a keyboard separate from the main computer. It can be locked to any external composite video signal.

PRINCIPLE FEATURES

* Up to 14 lines of text can be displayed on each page, with up to 200 lines in a page sequence.
* Up to 100 pages can be displayed in a sequence.
* 11 fonts are supplied although they can't all be held in memory at the same time.
* Lines of text can be enclosed in a 'band' across the screen to produce sub-titles.
* Each line of text, and the band around it, may be displayed in any of 16 colours.
* The position, typestyle, colour and size of text on any line is selectable.
* The horizontal position of each line can be set manually or automatically centred or left or right justified.
* The time that each page is displayed on the screen is selectable from 1 to 99 seconds.
* The time between a page being removed from the screen and the next page being displayed is selectable from 0 to 99 seconds.
* 8 types of screen wipe are available to wipe pages on or off the screen.
* Any line, page or sequence can be edited at any time.
* Any page sequence created can be saved to cassette or disc for later use or subsequent editing.

PROGRAM OPERATION

On tape the program takes around six minutes to load, however, after about thirty seconds a colourful test card is thoughtfully displayed which enables the monitor to be correctly adjusted whilst the rest of the program loads. With a disc system the test card runs in first after which the SPACE bar must be pressed to load the rest. When loading is complete, on either version, the test card is replaced by the 'page Menu' screen display.



PAGE MENU

Both 'page' and 'line' menu screens are icon driven which makes the program easy to use without constant reference to the documentation. The page menu is where text is typed in initially. A count is kept of the total number of lines still remaining for use and the icons control such things as basic editing of text, page number, page wipes, 'on' and 'off' running time for each page, background colour and load and save functions. The thing to remember with the page menu is that the text will not necessarily be displayed in its finished form, its purpose is simply to permit entry of text and to set up various parameters via the icons. To complete the required display it is necessary to proceed to the line menu.

LINE MENU

The icons displayed on this menu effect the individual lines that you have entered on a page and include the setting of text colour, character set, line edit, text position, 'band' colour and selection of the wide range of graphics symbols available to embellish your titles.

Titles can be superimposed on a live video picture.

A 'see page' icon enables the page which you are working on to be displayed as it will appear in the final title sequence, thus enabling you to keep a close check on your work. The SPACE bar toggles between the displayed page and line menu.

An 'edit line' icon enables you to edit or delete individual lines on the page currently displayed. It may also be used to add lines to the end of text, delete lines from anywhere on a page, insert new lines or re-type any line.

Although each line is set up separately for colour, type style etc, you may want several consecutive lines to be displayed in the same way, for this an 'auto' icon is available. This icon simply causes all of the lines on the page following the line pointed to to be displayed by the same settings as that line.

Auto centering and edge justification is handled by an appropriate icon although the line position can be handled manually if required.

DOCUMENTATION

The user's manual is quite comprehensive in its content and, in common with most packages of this type, is intended mainly as a reference manual.

As usual the reader is advised to read the manual fully before sitting at the keyboard and trying out the program. To my mind this is a very boring approach and, if taken literally, often serves to confuse the user and diminish ones initial enthusiasm for the software. After all, it is not until you actually start to use the package that you find out what bits of the manual you wish to read. To have waded through the whole thing first will surely fill your head with a lot of unneccessary complication.

I think a far better approach would be to write a short introduction (which this manual has) to give the general idea, then take the user through a short tutorial to illustrate exactly which buttons to press to achieve certain results. Getting the user to achieve quick results will create a good first impression and stimulate the want to delve further into the manual and to experiment.

For a package which is primarily intended for semi-professional users I was surprised to find pages devoted to the description in detail of the keys on a standard computer keyboard, as well as detailed explanations of such terms as Icons, Menu, etc. It even goes to some lengths to explain that 'dials and switches' are used to adjust the brighness, contrast, colour etc on a TV set, almost as if the operation of a TV set were something new! To put it in context though the passage does go on to compare these facts with the operation of icons.

Tape loading instructions are comprehensive and guidance is given if the program fails to load correctly, although this again should be fairly obvious to most users. Having said all that, perhaps there is something to be said for detailing all this information, there are bound to be some users who have never used a computer before and, for them, it may be of some use. The menu pages and their icons are explained in some detail although the use of the extra graphics blocks is rather sketchy and needs some experimentation to get to grips with.

Subtitles can easily be added to a video picture.

An excellent index makes it very easy to go straight to the required section in the manual.

Generally the manual is comprehensive and easy to read. Its presentation and layout is orderly and users should find little difficulty in using it.

A separate card illustrates all the various graphics blocks, shapes and pictures which are available within the package and details of the keys used to call them up are shown. This card is most useful when designing the finished page appearance.

FUTURE EXPANSION

Registration of a software package entitles the purchaser to full software support and information as it becomes available. More fonts are likely in the future as is a font compiler program which will allow the user to create his own fonts for use within the existing package.

CONCLUSIONS

A really exceptional piece of software. This package is of a very high standard and exploits to the full the 8-bit MSX computer system. The fact that use is made of the superimpose facility found on certain machines makes the product as versatile as it is possible to go. The intelligent use of icons and the thoughtful presentation makes it easy to use.

There is one other small facility which is not detailed in the manual, but which could be most useful to ATV'ers using the program for contest working. From the manual it seems that a page can only be displayed for up to 99 seconds, whereas in fact by pressing the computer's 'STOP' key a page may be held on screen indefinately.

The facilities available ensure that really professional-looking titles can be edited into your video material, adding a whole new dimension to videography.

Its use for amateur TV also makes it a very worthwhile aquisition. In fact I might go so far as to say it is worth buying an MSX computer just to be able to use this package.

Now comes the crunch; it's not cheap - in fact at a retail price of £80 plus VAT I consider it to be quite expensive. Granted it IS aimed at the professional market but it is still a considerable outlay for the amateur. I am sure though that for anyone with a real use for a good titling program, the money will be considered well spent. Verdict: A superb program, a bit expensive but highly recommended.

Video titler and display program is available from;
Anglosoft, P.O.Box 60, Coventry CV1 5SX or Memory Video, 2 Princess Street, Accrington, Lancs BB5 1SP.

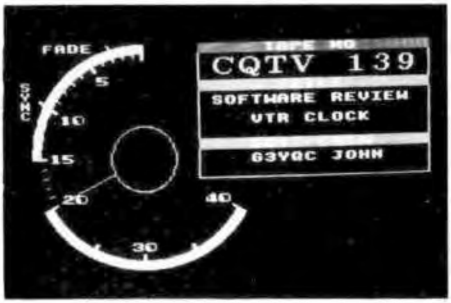
SPECIAL OFFER

ANGLOSOFT are offering a generous 25% discount off the above price for BATC members. Please order direct from Anglosoft quoting this article and issue of CQ-TV.

VTR CLOCK - MSX

The second program available from Anglosoft is a full featured VTR clock whose presentation and facilities show it also to be aimed at the professional market.

On running the program the clock is displayed on the screen together with a colourful text information area to the right, in which the tape number, title and edit crew details are inserted by the user. The program also incorporates two simple 'test cards': The first is simply a standard set of colour bars with the bottom third of the graphics area coloured plain red. The second is a set of full height (graphics area) colour bars.



CQTV 139

SOFTWARE REVIEW
VTR CLOCK

G3VQC JOHN

Full cursor control is available within the text area and the computer's FUNCTION keys are used to provide various facilities:

KEY 1 to start the clock.
KEY 2 to turn a logo on or off (not present on the review copy).
KEY 3 to select 20, 30 or 40-second start times.
KEY 4 to select test card number 1.
KEY 5 to select test card number 2.
KEY 6 to colour the text in the title area.
KEY 7 to colour the clock itself.

The SPACEBAR is used to reset the clock whilst it is running, to return to the clock after 'fade' and to return to the clock from a test card.

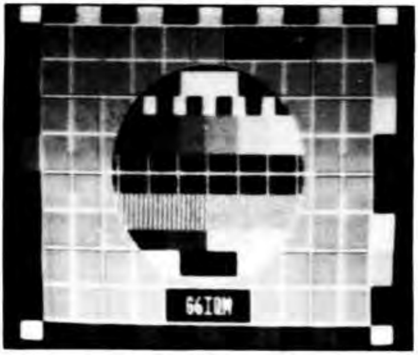
At the expiry of the clock run time the screen blacks out leaving a totally blank screen on most computers and a 'transparent' screen on machines like the PX-7.

The program is very well written indeed, is fast in its execution and has all the facilities which one would expect from a professional piece of software.

At the time of writing no price was available for this program, however, further information may be obtained from the addresses above. VERDICT: Excellent and highly recommended.

ATV SOFTWARE SUITE - (for BBC, Master, Electron)

This suite of programs for the BBC-B, Master and Acorn Electron computers is a sophisticated package written especially for the amateur TV enthusiast. The software is supplied on disc only (40 or 80 track) and comes with a set of instructions for loading and running. Program selection details are on a menu page displayed on-screen. A 'help' page contains full instructions on the various programs (even with the spelling mistakes!) and scrolling through them is under keyboard control. Initially a 'custom' copy of the software is made personalising it for individual use. You can input the time, your call sign and two lines of text. The information is automatically stored on disc and is used on the various screens as directed from the keyboard.



The two test cards in this package are both in colour. The first is a conventional broadcast IBA look-alike card, with the call sign displayed. The second card is a more unusual pattern, with a centre circle enclosing grey scale and colour bars, cross hatch and castellations superimposed onto a cross hatch background. The call sign and digital clock readout are also featured on this pattern.

The next two screens are both clocks. The first is an analogue display with a sweep hand, the call sign and text message being displayed beneath the clock. The second one is much smaller and located in the top right hand corner of the screen, with the call sign again underneath and also a digital time readout. This screen is ideal for superimposing onto a camera picture or whatever.

The next program within the suite is 'Hamfax creator'. This is a system for creating pages of mode-7 text and graphics, using an on-screen editor to allow you to create your own user defined graphic characters. These pages can be stored on the disc and displayed in any order and with variable time limits between each page. Background and foreground colours can also be selected. Since the Acorn Electron does not have mode-7, 'Hamfax Creater' cannot be used with that machine.

'Giant Size Print' and 'Multi Print' are the next two items on the menu. The former reproduces, full screen, any single character. If a string of keys is pressed, then each character appears for about one second, the last one

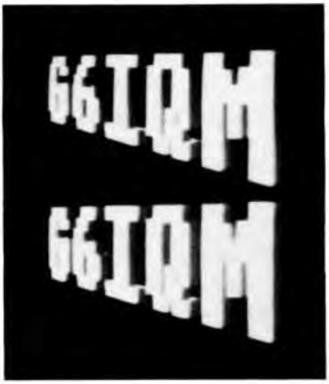
'Multi Print' allows you to type messages onto the screen in a choice of colours, and with a choice of background colours. The size of the text can be normal or double width, normal, double, triple or quadruple height, or any combination of those. This screen has a wrap-round feature, whereby the cursor returns to the top left of the screen after the end of the page, further text is then written over the previous one. This can lead to some confusing messages until the technique of reading and/or writing is perfected.

A very unusual and effective program is the 'Call Sign Generator', where your call sign is produced graphically on the screen, in block relief and with perspective. Somewhat difficult to describe, it has to be seen to be understood, but the effect is pleasing and unusual.

Finally, other features of the suite include colour bars with call sign and message, crosshatch with call sign, a distance and bearing calculator and a VCR countdown clock with a cueing facility.

Altogether this is a useful package of programs for the ATV station and at a sensible price. The package is easy to use and one is not constantly delving into a book to find out how to drive it. The sensible provision of a 'help' page is a great asset in this.

Price £8.95. Elan Soft, 3 Abbotsgrange Road, Grangemouth, Scotland FK3 9JD.



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SSTV FREQUENCY – 144.5MHZ

VHF communications

A Publication for the Radio Amateur
Especially Covering VHF, UHF, and Microwaves

The piece in the last issue (p4) requesting subscription information on VHF Communications magazine certainly evoked a considerable response from you. For about four weeks following publication I received a steady stream of air calls, letters and telephone calls, all proffering the required gen. To all those who took the trouble I offer my thanks.

VHF Communications is a really excellent magazine for the VHF, UHF and microwave enthusiast. The articles which it contains are technically excellent and written in a practical way. Printed boards are usually available from the magazine as are hard-to-get special components or even complete kits.

VHF Communications is published four times a year and is available from: Verlag UKW-BERICHTE, Terry Bittan oHG, Subscription Service, P.O.Box 80, D-8523 Baiersdorf, West Germany. Payment of £9.50 may be made by personal cheque or a bankers cheque for DM24.00. An attractive alternative is to pay by credit card; ACCESS, VISA and their variations, in which case you get it a pound cheaper. Just quote your number when ordering in the usual way.

This magazine has been around for quite a number of years now but still manages to retain the same freshness and overall excellence with which it started. For the TV'er there have been a number of articles on the subject although many of the projects can also have ATV applications. If you used to take VHF Communications and your subscription has lapsed, now is the time to renew. If you don't know the magazine I strongly recommend that you take a years subscription so that you may judge for yourself.

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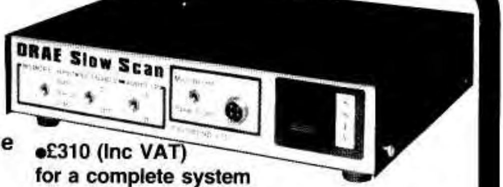

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BRITISH MADE

DRAE

COLOURISING THE CROPREDY TEST CARD

BY Garry Shipton G4CRJ
& Richard Carden VK2XRW

Two minds with but a single thought....and so far apart as well!.

I have received not one, but two articles describing how the popular Cropredy electronic test card kit (marketed by Cirkit) may be upgraded by the addition of colour to the tonal areas of the pattern. It is a further coincidence that both designs use the same colour encoder chip - TEA2000. However, because each deals with the concept in a somewhat different way, I thought it best to combine the two articles and leave it up to the constructor to choose which design to build.

I have built two colourisers from the G4CRJ design (which was the first received by several weeks) and they both worked first time. I havn't had the opportunity of constructing VK2XRW's design but I'm sure it will work equally well.

Editor

THE G4CRJ DESIGN

The Cropredy electronic test card generator produces a monochrome picture comprising cross hatch, grey scale, multiburst (definition bars) and various other patterns, all of which go to make up a complete test card not unlike the standard IBA pattern. The card also contains a large callsign together with a couple of lines of smaller text. With these features, it has been adopted by a number of TV repeaters for identification and GB3HV (my local repeater in High Wycombe) is no exception.

Our repeater computer generates colour pictures (block graphics) so it would be nice if the test card was in colour too. An examination of the actual circuit indicated that this should be quite straightforward to accomplish.

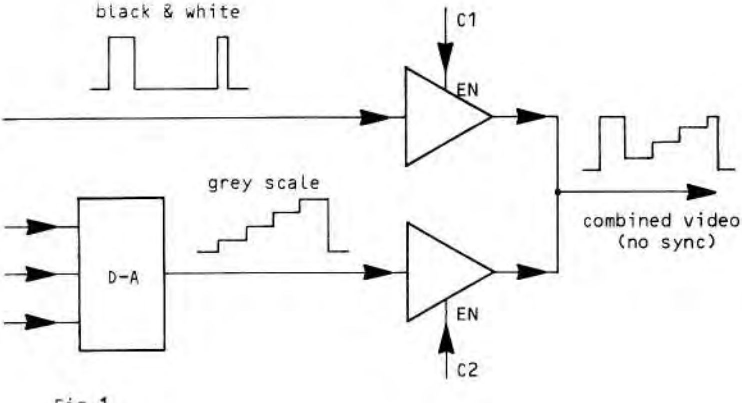


Fig.1

Fig.1 illustrates how the complete picture is built up. The black and white parts, at TTL levels, are passed through a tri-state buffer controlled by C1. The intermediate levels used by the grey scale and rectangles above the needle pulse are produced from three TTL signals which control a D-A converter, whose output is enabled by C2. The composite waveform is then formed by multiplexing the two waveforms together under the control of C1 and C2; the sync pulses being added later.

The same principle is used to produce a colour picture. Fig.2 shows the additional circuitry required and details the connections from the test card board itself. The three D-A signals are multiplexed with the black and white signal and only C1 is needed to control the 74LS157 quad 2-line to 1-line multiplexer. At this point, the resulting R.G.B. signals and syncs from Q2 on the test card board could drive an existing PAL coder, however, since one was not available, a TEA2000 single chip colour encoder was employed instead.

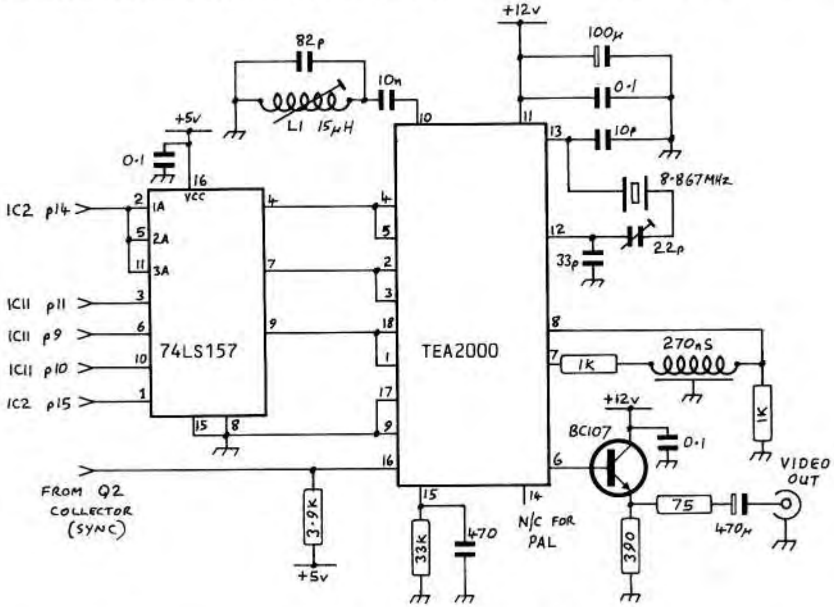


Fig.2 TEST CARD COLOURISER CIRCUIT

CONSTRUCTION AND ALIGNMENT

Decoupling on the TEA2000 is quite critical and the capacitors ossociated with pin-11 should be close to that pin and connect to a short ground plane around pin-9. Otherwise construction is fairly non-critical, although it makes sense to keep component leads and wiring as short and direct as is reasonably possible. A printed board is probably the best method of construction although Vero should be OK.

L1 is tuned for maximum burst as seen on a 'scope connected to the video output. The 22pF trimmer capacitor sets the colour subcarrier frequency which can be measured using a frequency counter on pin-12, using a low capacitance probe and a 10k resistor in series to prevent frequency pulling. NOTE: the crystal operates at TWICE the colour subcarrier frequency. If a counter is not available then use a colour monitor and find the extremes of the colour locking range, indicated by breaking-up of the colours, and set the trimmer halfway between these points.

The components on pin-15 set the frequency of a ramp generator which determines the duration and position of the colour burst.

Now view the composite waveform on an oscilloscope and adjust L1 for maximum colour information. The amplitude of the colour bars will extend above peak white and below black level (see Fig.3).

When the circuit is working correctly and using the standard EPROM pattern supplied by Cropredy, the grey areas will now be coloured. From left to right the grey scale will be CYAN, GREEN, MAGENTA, RED, BLUE and BLACK. Above the needle pulse will be GREEN, RED, GREEN.

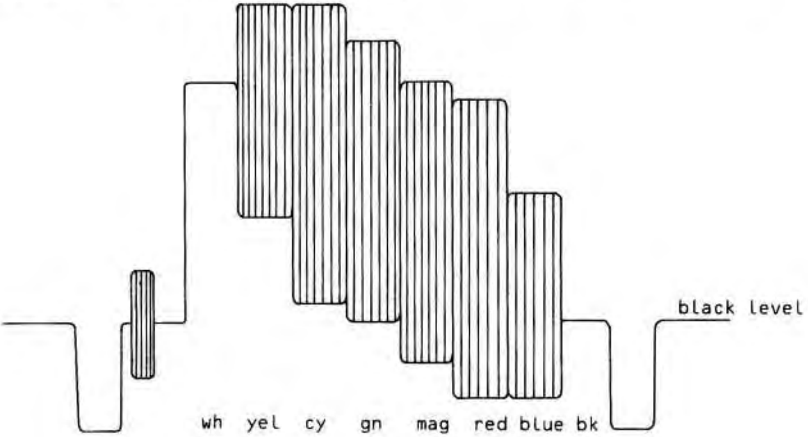


Fig.3 LINE WAVEFORM OF 100.0.100.0 COLOUR BARS (100%)

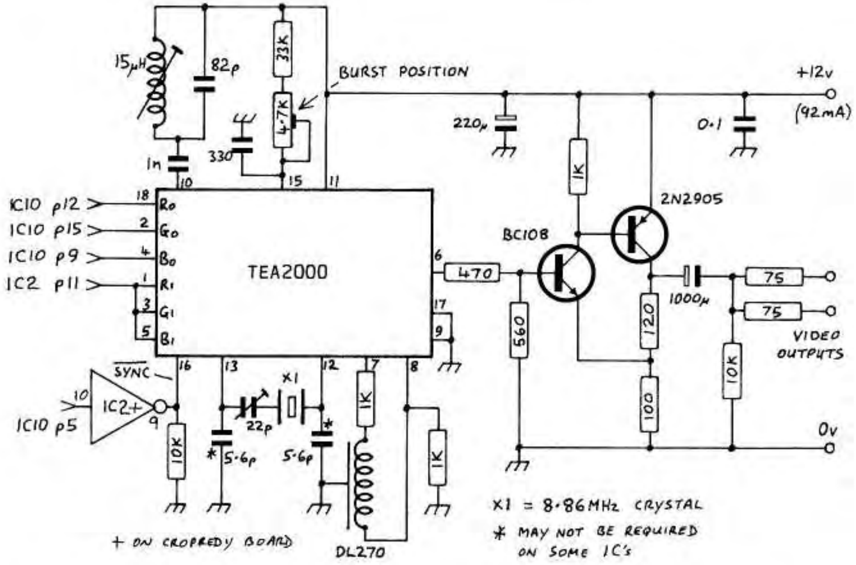
THE VK2XRW DESIGN

Having built the Cropredy test card generator and, armed with some EPROM patterns from the Worthing TV Repeater Group, I decided to have a go at producing colour from it.

My aim was to use the existing grey-scale outputs from the '377. Although the luminance levels would be incorrect, for this application that didn't matter. My main problem was to find an encoder to bring the various available waveforms together unfortunately, most encoders require burst gate, sync, sub-carrier and PAL ident; these wern't easily available so I looked further.

I discovered a philips chip, the TEA2000. This is a complete single chip colour encoder which only requires syncs and a set of TTL level RGB signals to drive it. It has its own subcarrier oscillator built in so it seemed ideal for my application. The other requirements were that, for PAL operation, composite (field and line) syncs must be used. The blanking input (pin 17) must be kept high during sync and colour burst, unless all colour inputs are low at this time. In this application blanking is not used and pin-17 is simply grounded.

A prototype was constructed to the circuit shown in Fig.4 and this worked first time. The luminance section was not used in my original and the combined chroma signal from pin-6 was added via a small capacitor to the existing output stage. The only real problem was one of colour crawl on the sharp transitions of the test pattern, however this could be reduced by wiring a suitable capacitor in the Cropredy output stage to reduce the rise time. Now though I use the TEA2000's luminance section, together with a suitable output amplifier, thus replacing the unit's existing output circuitry, this is much nicer.



X1 = 8.86MHz CRYSTAL

* MAY NOT BE REQUIRED ON SOME IC's

+ ON CROPREDY BOARD

Fig.4 VK2XAL TEST CARD COLOURISER CIRCUIT

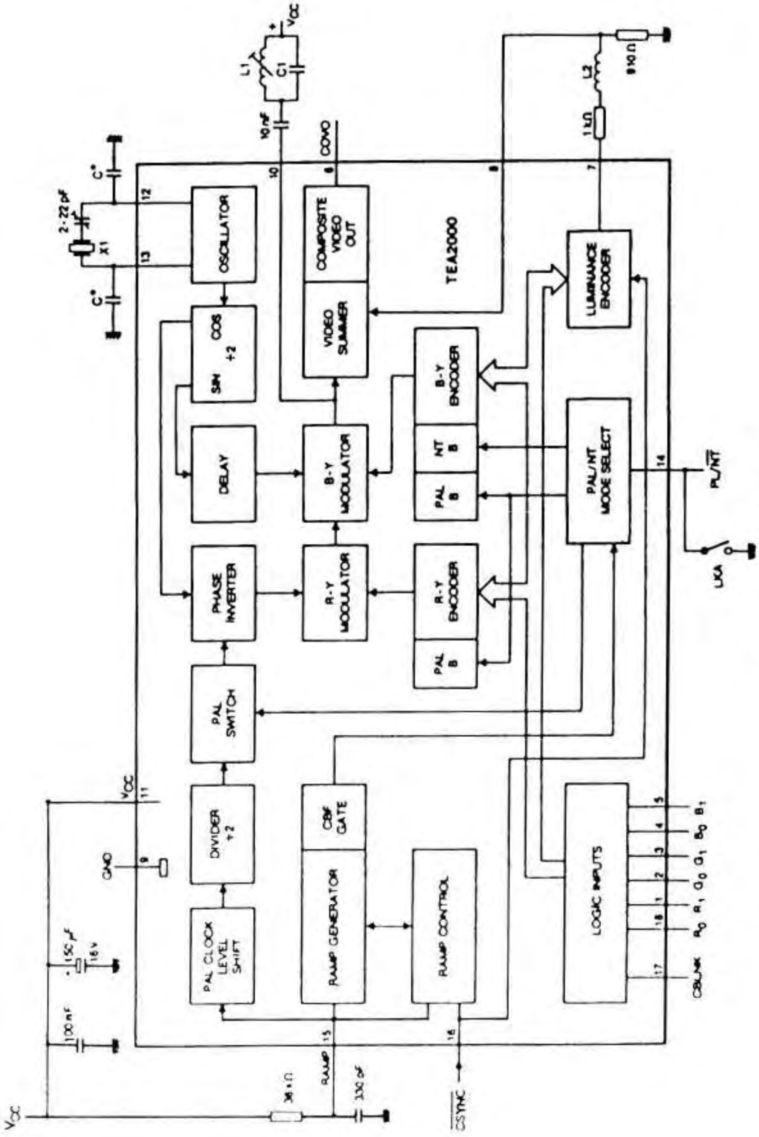
The TEA2000 requires a 6-bit binary input at TTL levels. In the first prototype the two bits per primary colour are connected together, however, in this case, R1, G1 and B1 are joined together and connected to the luminance output from pin-11 of IC2. Note that IC11 is no longer required and may be removed from the board. The unused inverter in IC2 on the Cropredy board can be used to invert the sync signal in order to provide the correct signal for the encoder: Pin 10 of IC2 should be cut and re-routed to pin-5 of IC10, the inverter output (pin-9) then feds pin-16 of the TEA2000.

The unit adjustment is similar for the circuit previously described.

This version uses a video distribution amplifier from which up to about 4 separate 75-ohm video feeds may be taken at the same time.

The main components for these circuits are available from Maplin Electronics. They are: TEA2000 (UH66W), DL270 delay line (UH84F), 8.867238MHz crystal (UH85G) and 15uF adjustable coil (UH86T). The numbers in brackets are Maplin's stock numbers. If (as I do - Ed) you have trouble getting parts reliably from Maplin then a phone call to Bonex Ltd may prove fruitful.

The Worthing Group have now built the G4CRJ design, so we can confidently expect to see some new (or modified) patterns which make better use of the new dimension of colour. Keep an eye on their adverts in CQ-TV.



TEA2000 BLOCK DIAGRAM

Fig.5

BATC '87 RALLY

By Jenny Hirons.

This year's convention was held on Sunday May 3rd and proved to be just as popular as always, attracting visitors from all over the country as well as several EATWG representatives from European member countries, over here for the round of official meetings.

First the bad news. If you recall my statement in last year's convention report that I hoped to be licenced by the next time I wrote a press report? well, you guessed; "refered last May refered last December" so I'm waiting to see if May 1987 is going to be a pass 'cos it's costing my old man (G6TGJ) a small fortune. Anyway on with the report...

Before detailing the exhibitors a mention must be given to the lectures held in the Stanford Suite throughout the day. These included talks on ATV repeaters, satellite television, digital effects in television and studio lighting, not forgetting of course the IARU report.

L to R: G8PTH, XYL of HB9RWD, HB9RWD, HB9SVW.

Centre of attraction in Stanford Suite 2 was a nostalgic trip down memory lane in the form of an EMI 203 image orthicon ex-broadcast camera from the 1960's. Thanks to Brian Summers G8GQS for bringing along this fine example. G8MJW Paul Marshall demonstrated his 'Home Brew' colour flying spot scanner, and the Home Counties ATV group announced, after a 2 year struggle, the licencing of their High Wycombe repeater GB3HV.

Bristol ATV Group. L to R: G4ZQF, G1IXE, G3JMY, G4YQR, G8VPG.

JVL Electronics displayed their loopquad Yagi aerials for 24cms, these were previously reviewed in CQTV 131. An impressive demonstration by Mike Phillips from Anglosoft of the MSX computer graphics system attracted lots of attention, their lecture also provided a good insight into the production side of TV. This issue of CQ-TV carries a review of their titling and display program which is well worth a look.

HS publications had an excellent range of DXTV books and videos illustrating even more the diversity within the amateur TV hobby. There was an interesting digital framestore in kit form from a new exhibitor; Oggitronics of Malden Essex, who manufacture a range of video framestore units for image processing applications. The kit on display was described briefly in the last CQ-TV. The Bristol repeater group, operating GB3ZZ, were also there and they wished to express their thanks to the B.A.T.C. for the help in obtaining their licence which they had just received. They also brought with them a quantity of broad band 24cm aerials which were sold out by lunchtime!

There were various 'junk' stalls displaying such wares as computer discs, software, power packs, meters, scope's etc. G8UWS John, from Folkestone, had a good supply of PAL coders, components, signal generators any many more bits and pieces. Of course in amongst all this was the Worthing and District ATV Repeater Group with their usual fine selection of software and kits. Of particular interest was the Solent range of 24cm kits including pre-amps convertors and transmitters.

Remote Imaging Group. L to R: G8XTW, G3REM, G1TUL.

There was special interest in the G0AVG (all very good) Amateur Video Group who put on an excellent display. The B.A.T.C stand was very popular as usual having a variety of publications and sales items and, of course, collecting overdue subs' (must pay John's sub's, he's probably forgotten!).

In the Crick room, sporting a range of TVRO equipment, was John Standen of North East Satellite Systems, who incidently runs courses on the installation of satellite systems. There was a live, and I must admit superb quality picture from a satellite system whose dish was just outside the doors mounted on a trailer. If I get a letter from the bank I'll know what John has bought! Doug Pitt demonstrated N.B.T.V. to some very interested parties and the Remote Imaging Group completed this area with a range of meteosat down convertors, Vhf recievers and the like.

The Albany suite held all the usual stands plus some new exhibitors. Wood and Douglas were there with a nice new 24cms linear (see review in this mag.), needing just 20mW of drive to produce 20 Watts of RF. A new company this year was Technical Software who had some very nice programmes including some for SSTV. A.Kelly of MET antennas, agents for Drae slow scan and Microwave Modules, had a very nice stand which seemed to be attracting a good bit of interest.

Who is this selling raffle tickets for the GB3RT Rugby Repeater Group? None other than CQ-TV's editors G6IQM and G3YQC. They, with lots of support from the rest of the group, also ran the 'official' bring and buy stand which did very brisk business all day. Another new-comer to the rally was David Allen G8LWD of Camtech Electronics. This is his first year and he introdced a new 23cms reciever kit along with a pre-amp. This company is going places I think and worth keeping an eye on. Satallite Systems had a TVRO stand next to the bring-and-buy and the pictures from their demonstration system were

BATC editors at play! G3YQC (R), G6IQM (centre) and G1GPE in support.

very good indeed. Lots of TVRO modules here including the Astec modules. Micromax RF Systems introduced a new range of 23 & 13 cms antennas. Their products are designed and manufactured by themselves and certainly looked very good indeed. Good old Bonex were there in strength flashing a shiny new catalogue. This was well worth the quid and includes lots of good quality components. (see review in this issue).

Now for a look outdoors. An even bigger marquee housed an amazing collection of goodies: Astley Video had a large collection of video cameras and monitors etc. Mechanlec, here again from last year, displayed ex-computer equipment including keyboards, power supplies and many other items and spares. Ward Electronics of Birmingam, agents for Trio, showed mainly new gear plus a good supply of aluminium boxes, components, and a very interesting kit for SSTV. Some more interesting bits and pieces including prestel boards various components and lots more were on show from P.H.Surplus of Nottingham.

Durham Mid-TV Group. L to R:
G6UEV, G1KRX, G1FBY, G1SRZ.

PA0SON (R) with PD0HOT
filming on the Bonex stand.

Worthing Group. L to R:
G8HSY, G8VEH, G4WTV, G8XEU,
G8KOE, G8DHE.

View from the bring-and-buy stand.

Barenco were back with aerial accessories cable & brackets. Link Brook had computer bits, joy sticks etc. and of course Brial Services, (where is Albie?) were also present. Stevens Electrical of Birmingham and many more brought to the marquee the biggest selection of goodies yet at a BATC show.

G8SFM Ken from Sitek had a good range of ex-military equipment and PLM communications were also there with the usual excellent range. Peter Hayward

G3JMX from Lowestoft had an interesting stand supplying components with the accent on microwave and VHF. Running around the marquee, and very low to the ground, was a radio controlled car, the same one no doubt that tried to run me over last year, driven, from a distance by G1EGD Brian who has built this unit and equipped it with a 24cm transmitter and camera. The resulting pictures were displayed on a monitor on his stand as well as being recorded on U-Matic for the BATC. Outside the tent, in very windy conditions, Dick Wallinger was being very adventurous in flying a radio controlled helicopter, again carrying a CCD camera and transmitting pictures down to Brian's stand.

Many more exhibitors displayed their goods outside which included everything from 'car boot' type sales to second hand gear on trestle tables. Let's not forget Ham shack of Hanley with their range of used equipment and Ted Eggs G6CTV who had some second-hand cameras. Ted incidently runs the film unit for British Rail. One thing's for sure; I think everone was pleased with the show.

Time to catch up with John who has been filming the entire event with a broadcast camera, looks like a one man ENG crew, where's your sound man John? where's your assistant John? Where's the bar? let's have a pint. 73s all from both of us and apologies if we missed anyone out.

Grateful acknowledgement to Deryk Wills, G3XKX for taking the photographs.

A model helicopter equipped with a CCD camera and 24cm TV transmitter, flown here by Dick Wallinger with pictures beamed back to Brian Parkin in the marquee. (Photo's Brian Parkin G1EGD)

DOWNSTREAM KEYER

By Richard Carden VK2XRW,

A very useful piece of equipment to have in your ATV station is a 'downstream keyer'. This will allow you to automatically ident your pictures with your call sign every so often, thus complying with licence requirements. The circuit described here was originally intended for repeater use, but it is ideally suited to this purpose. The circuit has been derived from two separate sources: the sync separator taken from the VK4 vision modulator and the character generator and keyer circuit from the BATC Amateur Television Handbook 1, pp33-42.

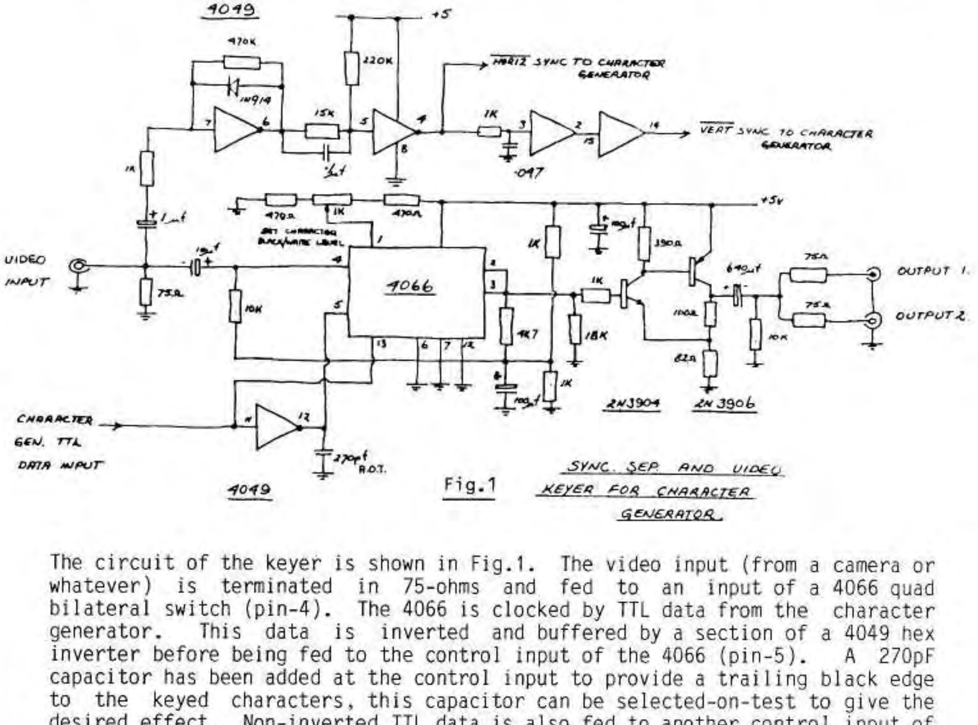

4049
470K
1N914
220K
+5
HORIZ SYNC TO CHARACTER GENERATOR
15K
½µf
1K
.047
VERT SYNC TO CHARACTER GENERATOR
1K
1µf
470Ω
1K
470Ω
SET CHARACTER BLACK/WHITE LEVEL
+5v
10µf
VIDEO INPUT
10µf
75Ω
10K
4066
4K7
10µf
1K
1K
18K
390Ω
1K
640µf
100Ω
82Ω
10K
75Ω
75Ω
OUTPUT 1.
OUTPUT 2.
2N3904
2N3906
CHARACTER GEN. TTL DATA INPUT
270pf S.O.T.
4049
SYNC. SEP AND VIDEO KEYER FOR CHARACTER GENERATOR

Fig.1

The circuit of the keyer is shown in Fig.1. The video input (from a camera or whatever) is terminated in 75-ohms and fed to an input of a 4066 quad bilateral switch (pin-4). The 4066 is clocked by TTL data from the character generator. This data is inverted and buffered by a section of a 4049 hex inverter before being fed to the control input of the 4066 (pin-5). A 270pF capacitor has been added at the control input to provide a trailing black edge to the keyed characters, this capacitor can be selected-on-test to give the desired effect. Non-inverted TTL data is also fed to another control input of the 4066 (pin-13). This DC level is only switched in during transmission of the characters and allows the contrast level to be varied between black and white. The combined output is routed to a video buffer stage giving two 75-ohm outputs.

Two modifications have been made to the character generator circuit brought about by the inclusion of the keyer: The first, shown in Fig.2, is to replace IC2 (74123) in the original circuit with a 556 timer, this gives better vertical and horizontal locking.

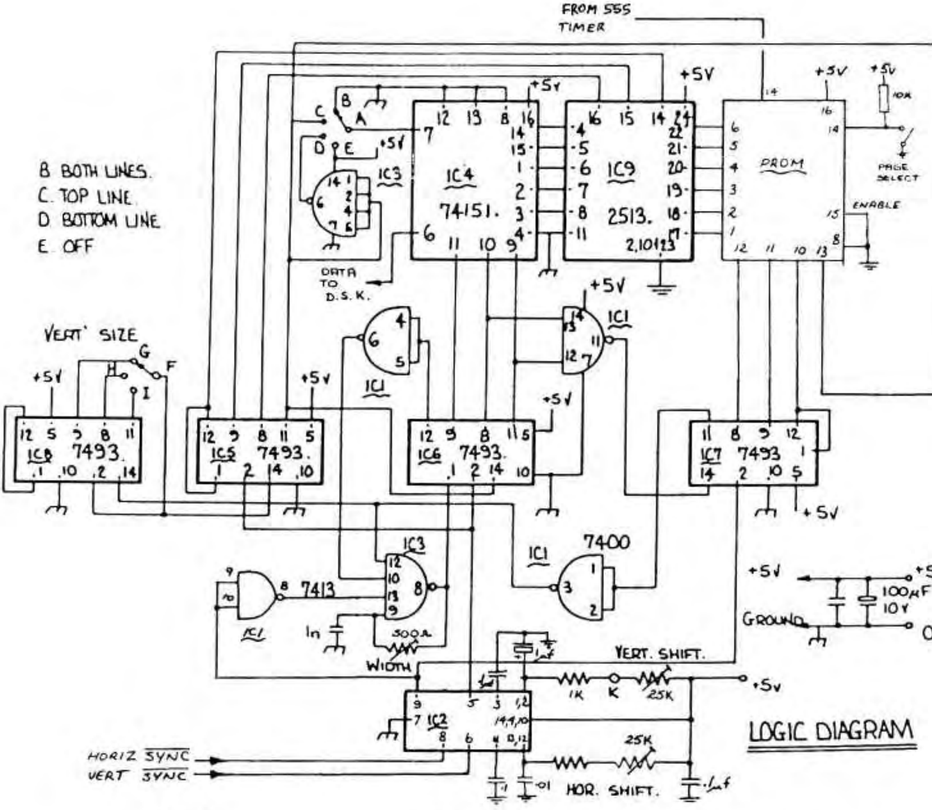


Fig.2

IC2 - 556

MODIFIED CHARACTER GENERATOR FOR PROM (16 PIN).

The other modification (see also Fig.2) is to remove the diode matrix and encoder chip IC7 (character set) and replace this with a PROM. Several PROMs could be paralleled together and, by switching their chip select inputs (pin-14), different screens of characters could be selected.

A variation on this is shown in Fig.3, where the circuitry for the inclusion of a 2716 E-PROM is shown. This would enable you to have four screens of information in the one device. Also shown in Fig.3 is the programming table for one page of the E-PROM with a specimen code shown.

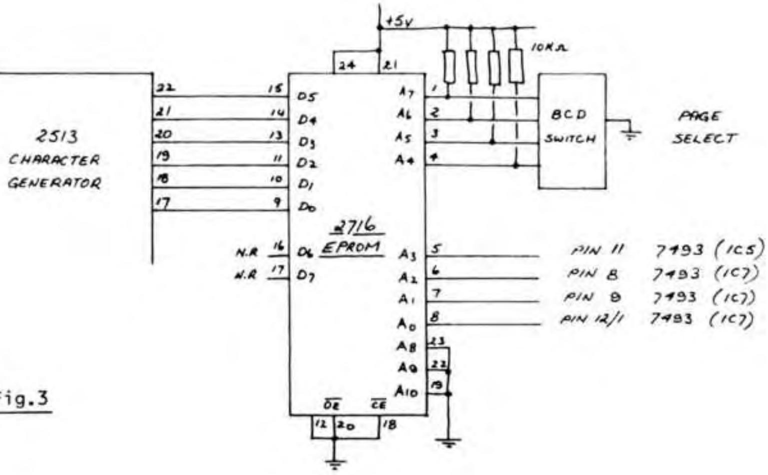
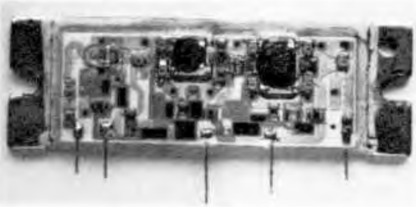


Fig.3

	PAGE SELECT				ASCII CODE		
A10 A9 A8	A7 A6 A5 A4	A3 A2 A1 A0	HEX		D7 D6 D5 D4 D3 D2 D1 D0	HEX	INFORMATION
0 0 0	0 0 0 0	0 0 0 0	00			20	
0 0 0	0 0 0 0	0 0 0 1	01			20	
0 0 0	0 0 0 0	0 0 1 0	02			56	V
0 0 0	0 0 0 0	0 0 1 1	03			48	K
0 0 0	0 0 0 0	0 1 0 0	04			32	2
0 0 0	0 0 0 0	0 1 0 1	05			58	X
0 0 0	0 0 0 0	0 1 1 0	06			52	R
0 0 0	0 0 0 0	0 1 1 1	07			4C	L
0 0 0	0 0 0 0	1 0 0 0	08			20	
0 0 0	0 0 0 0	1 0 0 1	09			20	
0 0 0	0 0 0 0	1 0 1 0	0A			20	
0 0 0	0 0 0 0	1 0 1 1	0B			20	
0 0 0	0 0 0 0	1 1 0 0	0C			41	A
0 0 0	0 0 0 0	1 1 0 1	0D			54	T
0 0 0	0 0 0 0	1 1 1 0	0E			56	V
0 0 0	0 0 0 0	1 1 1 1	0F			20	
0 0 0	0 0 0 1	0 0 0 0	10				
0 0 0	0 0 0 1	0 0 0 1	11				
[illegible]	[illegible]	[illegible]	12				

ONE PAGE
TWO LINES
EIGHT CHARACTERS.

This is what the inside of a Mitsubishi SC-1040 1.3GHz PA module looks like. This one was blown up by a member and sent to CQ-TV for interest.
Who's going to design one for 13cm?



SPECMANSHIP

PART-2 - Noise

By Mike Wooding G6IQM,

Continuing this series on attempting to explain some of the technical terms and parameters encountered in our hobby, I will cover in this issue the subject of Noise.

Electrical noise is any voltage variation present in a system not created by man-made signals, and it is inevitably present in all systems to some degree. The presence of noise will in extreme cases interfere with the wanted signal to such an extent as to render that signal useless. Also, the fact of its existence sets a limit to the amount of amplification or processing that can be usefully employed. Unlike an interfering signal, noise covers a wider band of frequencies thus affecting receive systems over much of their bandwidth.

The main types of noise that we have to deal with in ATV are SKY noise, THERMAL noise and SHOT noise (sometimes referred to as Schottky noise). There are of course other sources of interfering noise such as lightning and from electrical equipment, but these are more often short lived. The type of noise listed in the three catagories is constant in nature and always present.

SKY NOISE

Now what have slow-scan pictures got to do with an article about noise....?

Sky noise is the background of electrical signals always present in the universe. Its source is in part from the nuclear furnaces we call stars. This type of noise is very wide-band with odd peaks and troughs through the spectrum. The principal source of Sky noise below 30MHz is atmospheric noise caused by electrical storms, (It is a paradox that the propogation effects which enable long distance communications possible at the lower frequencies, also provide good propogation for electrical storms throughout the world). Above 30MHz and well into the microwave bands cosmic radiation is the major source of sky noise. This cosmic noise is particularly troublesome for satellite communication systems as the ground aerials inevitably point towards the source of the noise as well as the source of the wanted signal. Other generators of sky noise are water vapour and oxygen. Due to their attenuation characteristics noise is produced in the 23GHz region of the spectrum, which fortunately at present should not cause us any problems!

It may be of interest to note here that the band from 2 to 8GHz is notably 'quiet' with regard to sky noise, and it is here that most space telemetry and radio telescopy takes place.

THERMAL NOISE

Perhaps the most troublesome source of noise within equipment is Thermal noise. This is generated by the random movement of electrons, causing collisions with other electrons, within a conductor. This noise is generated in all components and devices and covers an infinite frequency range, increasing in level with temperature. Resistors can be particularly bad generators of thermal noise, carbon composition types being especially good at this. However, good quality low noise varieties of resisitors can be obtained to lessen this problem.

Transistors and valves cause thermal noise because these random electron movements cause voltages to be produced at the collector and anode respectively. Also, in transistors noise is generated by the resistance in the emitter, base and collector materials. Thus, careful selection and 'doping' of semi-conductor materials can reduce this noise.

Noise generated in valves increases with the number of electrodes, hence a pentode, or a frequency changer such as a triode-hexode, introduces more noise than a triode. In addition, and just to complicate matters further, the relative noise level at the output of a device is greater when used as a frequency changer than when used as an amplifier. This requires us to employ several stages of RF amplification at the front end of receivers and converters, in order to present a relatively large signal to the mixer stages.

Thermal noise generated by valves and transistors unfortunately also increases with operating frequency. With most valves this increase begins to assume importance at about 50MHz. Transistors, however, can be manufactured to overcome this problem and thus they are more suitable at UHF and SHF frequencies.

SHOT NOISE

Shot noise is also caused by the random movement of electrons in conductors. But unlike thermal noise it is not caused by collisions between electrons. Shot noise is produced when charged particles (eg. electrons) move through potential gradients without collisions with other particles. In valves this noise arises as a result of the random emission of electrons from the cathode migrating to the anode, or other grids. In semi-conductors shot noise arises through the random diffusion of minority carriers and the random recombinations of 'hole-electron' pairs, (sorry about that - if you don't understand semi-conductor theory just ignore it - it's full of holes anyway!!!).

Not a lot really....!

Shot noise only becomes really problematical at higher frequencies and is generally only sourced within active devices. Thus, careful selection of valve and transistor types, to suit the circuitry and frequencies in use, can reduce this noise to an acceptable minimum.

There is also another source of noise in multi-electrode devices called PARTITION noise. This is generated by the division of current within the device, but for our purposes we can ignore this as a separate problem and I mention it for interest's sake only. You may also come across the terms WHITE and PINK noise. These are terms that encompass all the types of noise in a system. White noise denotes noise having a constant average amplitude at all frequencies, pink noise has an average amplitude that decreases with increasing frequency.

'Still they are very decorative.....

The effect of all this noise is to cause degradations of the received signals. If we consider an IF stage with an input of 100mV, then a noise voltage of 20uV would be insignificant, and not cause any real problems. However, if we consider the input to a receiver requiring only a few microvolts of signal, then our noise level of 20uV would be catastrophic. In amplification stages the noise content will be amplified equally with the wanted signal, (remembering that the noise is wide-band, thus containing frequencies within the band-width of the amplifier or tuned circuit). In frequency changers and mixer stages, the noise element may cause secondary mixing to take place producing spurious frequencies and unwanted harmonics, likewise in oscillator circuits.

Thus it can be seen that if noise levels are not maintained at a minimum then the resultant output of a receive chain could be seriously degraded, if not rendered totally useless. In a transmitter chain, unwanted signals could be generated which would distort the outgoing carrier and even, in extreme cases, cause out-of-band signals to be radiated. The use of high quality components, and the careful selection and matching of active devices, should ensure that noise produced within a circuit is kept to a minimum.

With noise measurements and the performance of equipment relative to noise there are two parameters used: SIGNAL-to-NOISE RATIO and NOISE FIGURE.

SIGNAL-to-NOISE RATIO

The signal-to-noise ratio of a piece of equipment is the relative level of the noise in comparison with the level of the wanted signal. In other words, it is a method of quoting the small signal handling capability of the equipment. The absolute level of the noise is really insignificant to us, but this ratio, usually expressed in decibels, is very important.

For a receiver it is usually quoted as that level of input required to produce the given S/N ratio at the audio output. As this noise is measured as a voltage, the S/N ratio is determined by the following equation:

S/N ratio = signal voltage (rms) / noise voltage (rms)

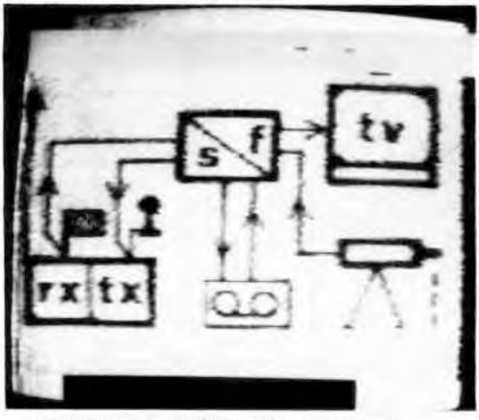
or in it s more usual form:

S/N ratio dB = 20log(signal voltage / noise voltage)

(It must be pointed out here that in this case to get our answer in decibels we multiply the logarithm by 20 and not 10, because we are dealing with voltage and not power).

An example of a receiver's S/N ratio could be: 0.5uV for 20dB S/N. In other words, a received signal level of 0.5uV would produce a wanted signal 20dB higher than the level of noise at the output of the receiver. In FM receivers it is quoted as the signal level required at the input to produce the quoted reduction in noise at the output, often referred to as 'Quieting'. In amplifiers the S/N ratio is quoted at the rated output and is the ratio of the noise to that output.

The term signal-to-noise ratio is less significant in low level RF circuitry for two reasons. Firstly, small signal RF circuits and devices do not always have a rated output as such, (although there is of course a maximum output to be obtained from (say) an RF transistor or pre-amplifier), the performance more often being quoted as a gain figure. Secondly, RF receive circuitry is normally operating with very low input signals, signals in fact that are often barely above the general noise floor. Thus, taking these two points into consideration, what we need is a way of quoting the noise performance of a circuit, or device, which will apply at all input/output levels within its specification. The parameter used to define this is the Noise Factor, or more commonly, the Noise Figure.



and help to relieve the tedium of....

NOISE FIGURE

The Noise Figure of a device or circuit is the ratio of the input S/N ratio to the output S/N ratio. Put more simply. it is a measure of the equipment's, or the device's, ability to detect, amplify or whatever small signal levels. Therefore, at low level RF applications, particularly more so the higher the frequency, special attention must be paid to the noise figure of the device or circuit if the best performance is to be achieved.

Because of the thermal and shot noise produced in an amplifier, the signal at the output will have a higher percentage of noise than the input signal did. The amount of noise added will then determine how small a signal the amplifier can detect. The

Noise Factor as a measure of this is determined by the voltage ratio shown below:

$$\text{Noise Factor} = \frac{Si/Ni}{So/No}$$

or in the more usual form ,and incidentally more useful, the noise performance is quoted as the Noise Figure, which is the relative level in decibels, calculated as shown below:

$$\text{Noise Figure} = 20\log\left(\frac{Si/Ni}{So/No}\right) \text{ dB}$$

where: Si = input signal voltage.
Ni = thermal input noise voltage.
So = output signal voltage equal to Si x amplifier gain.
No = total output noise made up of the amplified input plus any added noise.

Although measurement of the noise figure is not within the capabilities of the equipment found in most shacks it may be worthwhile to briefly describe the methods used in commercial electronics.

The noise figure can be measured in one of two ways, dependant upon the type of generator used. The easiest method requires a calibrated noise source, which usually consists of a vacumn-tube diode, whose DC plate current is controlled by changing the filament temperature (ie: by controlling the filament current from a constant voltage source). The shot noise from the tube is then added to the thermal noise of a 50-ohm resistor, which acts as the source impedance of the generator. The shot noise can then be calibrated on a meter in terms of the plate current.

full pages of just boring old text (not the content of course!)

This calibrated noise source is then connected to the input of the receiver, amplifier or whatever and a true RMS voltmeter connected to the output. Any AGC networks within the devices being tested must be disabled in order to achieve correct results. With the shot noise source turned off the noise voltage output is read on the voltmeter. The source is then switched on and the noise input level adjusted until the output level increases by 3dB, the noise figure can then be read off the calibrated meter.

The second method is much more intricate requiring the knowledge of the gain and bandwidth characteristics of the unit under test. A sweep generator is used to plot the amplitude characteristics, from which can be obtained the mid-frequency gain and the effective noise bandwidth. The total output noise is then measured using the RMS voltmeter, and the output noise figure calculated using this figure and the value of the resistive impedance across which the voltage was measured. The noise figure is then obtained from:

$$\text{Noise figure} = 10\log\left(\frac{No}{GKTB}\right)\ \text{dB}$$

where: No = Noise power output.
G = amplifier power gain.
K = Boltzmanns constant.
T = 290 degrees K (room temperature).
B = effective noise bandwidth.

CONCLUSIONS

When using devices in RF pre-amplifiers and receivers it is far more important to design for a low noise figure than for a high gain, unless that high gain can be achieved without causing a high noise figure. This must seem obvious when we consider a mast-head pre-amp for 1300MHz or 10GHz, or an LNA for TVRO applications, where the received signals may be in the order of fractions of a microvolt. A high noise figure in the front-ends of these units would completely ruin the effects of the high gain, producing an output signal whose content would be noisier than the input. This problem is just as important at lower frequencies as well, although due to easier (I use that word cautiously!) propogation of signals at VHF and UHF, higher noise figures can be accommodated

When tuning pre-amps and receivers it is important to tune for lowest noise response on the screen, or from the loudspeaker. It is very easy to be tempted to tune for maximum gain, however, this may be at the expense of the noise performance, and subsequently result in much poorer performance of the unit at low signal levels. In other words a possible P1 picture may be lost if the noise figure is corrupted by wrong tuning. Also, it is important to consider the band-width required of the various stages in a receive system, particularly the input and mixer stages. If the bandwidth is wider than necessary, then a larger spectrum of Sky noise will be admitted to the receiver, thus reducing the system noise performance.

Typical noise figures obtainable with RF bi-polar transistors are in the region of 1.5 to 5dB. However, since the emergence of readily available GaAsFET devices it is possible to achieve noise figures as low as 0.5dB, although these figures would be very difficult to arrive at with the construction techniques available to most of us. For most applications required by the amateur a noise figure of 1 to 2.5dB is acceptable and attainable with care by home constructors.

Many thanks to Allan Sancto DD5FM/G6BWH for supplying the SSTV photographs.

GREY/COLOUR BARS FOR THE 'WCY SSTV SCAN CONVERTER

By Brian Roberts G4VYG,

One very useful facility which is often included in the specifications of commercial SSTV equipment is the provision of built-in grey scale and colour bar generators. As an aid to setting up and checking transmissions it is invaluable when building and using home-brew equipment. Also, it is very useful to a receiving station to have these 'screens' available from the transmitting station, to enable accurate tuning etc.

This article describes an add-on board for the G4ENA/G3WCY SSTV transceive system (The Slow Scan Companion pp 52-75). The features provided by this modification are:

1) When transmitting in the 8-second mode, an eight shade grey scale over the whole frame for set-up purposes, or covering the bottom eight lines only for inclusion with a picture.

2) When transmitting in the 24-second Line Sequential Colour mode, a correctly registered set of colour bars, over the whole frame or on the bottom eight lines only on snatched pictures. On colour pictures loaded by the RGB method, a grey scale only will be present on the bottom eight lines of the picture.

CIRCUIT OPERATION

Referring to the circuit diagram in Fig.1; the grey scale bars are generated by a dual 4-bit integrated circuit (IC1), which is driven from the fast scan row counter on the digital board in the converter (IC27 pin 11) at 128 times line frequency. Counts 32, 64 and 128 are used to form a three bit code for grey scale generation, and individually one in each of the three colour memories for colour bar generation (see Fig.2).

The required output from the bar generator is selected by a 2 to 1 line data selector (IC2). A logic high on the select input (pin 1) of IC2 enables the B input, routing the counter outputs as a four-bit code to IC3. The most significant bit and the least significant bit are joined to give the 4-bit code required by the memory.

A logic low on the select pin of IC2 enables the A input, activating the colour bar mode. Each of the memories has to be loaded in turn with one of the count outputs, all four bits being the same. A quad tri-state buffer (IC5) selects each memory in turn using switching data from the converter's auxiliary board. IC4a is used to invert data from the tri-state buffer to present the colour bars the correct way round.

The required picture or bar data is selected for loading into the memories by another quad 2 to 1 line data selector (IC3). A high on select pin-1 outputs picture data to memory, a low outputs bar data. Switch S1 is an optional extra and allows the bars to beswitched off, inserted on the bottom eight lines of a picture, or loaded over the whole frame.

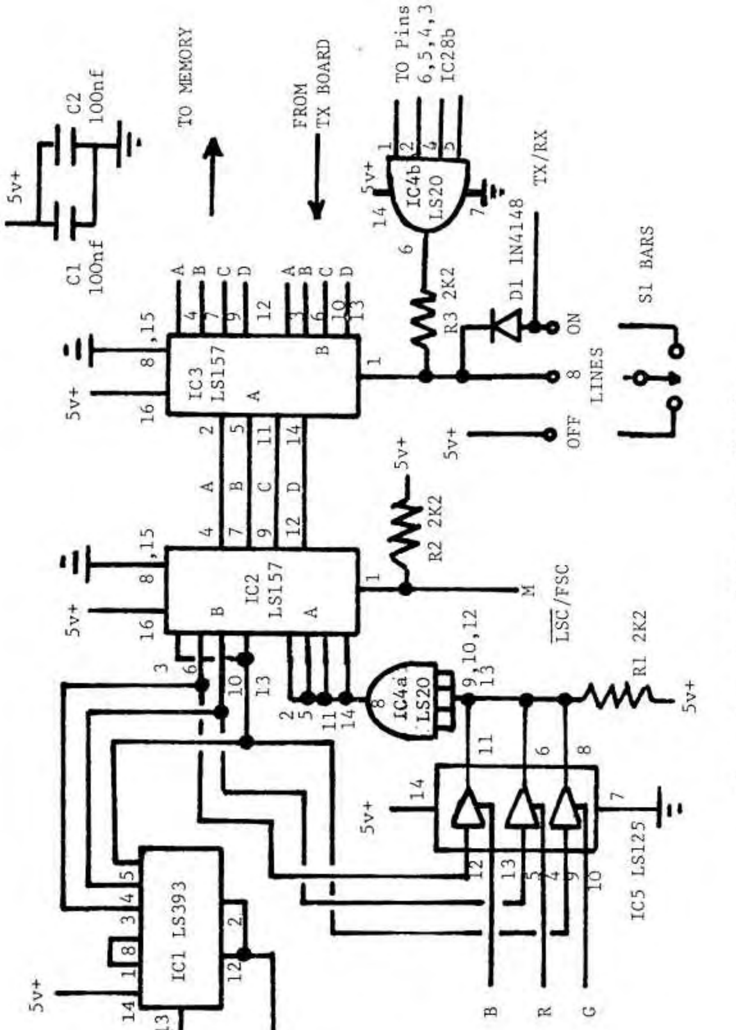


Fig 1 Grey Scale/Colour Bar Circuit.

The second half of the inverter (IC4b) is connected to the fast scan column counter in the converter. When the count reaches 120 the output of the inverter goes low, thus selecting bars which are then inserted on the last eight lines of the frame.

Diode D1 is fed from the transmit/receive switch on the converter, ensuring that when receiving pictures the bars are not selected.

CONSTRUCTION AND INSTALLATION

Either a printed board or Vero can be used for the construction. Mount the board in a convenient position in the converter, as close as possible to the transmit and memory boards. The shorter the data wires linking the boards the better. Remove the four video data output leads A, B, C and D from the transmit board and connect them to the memory output of the new board. Connect four new wires from the transmit board outputs to the transmit inputs A, B, C and D of the new board. Thus the new board is now connected in the transmit board output lines.

The count inputs for IC4 are taken from the Auxiliary board, IC28b pins 3, 4, 5 and 6. The RGB select inputs are taken from Snatch board hold outputs, IC5 pins 6, 2 and 4 respectively. The line clock and the reset signals should be carefully taken from the pcb side of IC27 pins 11 and 12 on the digital board. The M input is taken from the LSC/FSC switch on the converter. If the bar generator board is to be used with a converter having one memory for 8 second working only, the connections to RGB select and M may be omitted. Switch S1 can also be omitted if the bars are only required in the bottom eight lines of the picture.

This straightforward circuit performs extremely well and provides an efficient method for setting up the transmit converter as well as giving a 'professional' touch to the pictures.

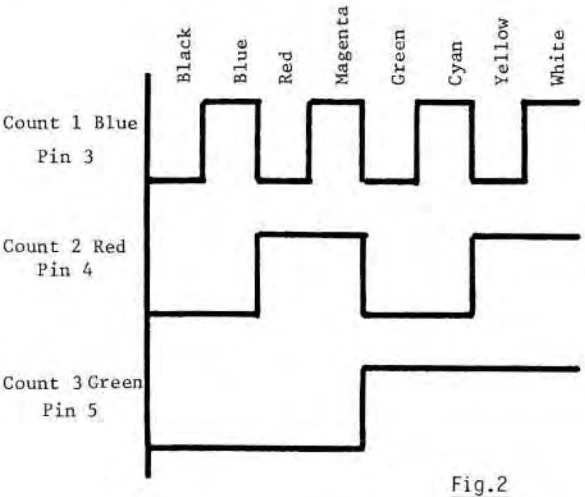


Fig.2

SOFTWARE NOTEBOOK

No.10 - SSTV patterns for the Spectrum

By J. Ashmore G8GXF

For those SSTV'ers who are also Spectrum computer owners, here are a couple of homebrew pattern generator programs that you may find useful. The programs are written in both BASIC and machine code, but the machine code is in the form of data which is read into memory with a short BASIC loader. The Screen attributes file is the block of memory in which the machine code programs are run. This is because this particular section of memory is similarly mapped in all versions of the Spectrum. However, let's first have a quick look at the BASIC versions:

BLACK AND SYNC

A very useful test pattern for aligning transmitters, this simple program produces a picture comprising 5mS line pulses, 55mS of black level and, every 128 lines, a frame sync pulse of 30mS duration followed by 30mS of black level.

```
10 LET L = 127
20 BEEP .03,26: BEEP .03,31
30 BEEP .005,26: BEEP .055,31
40 LET L = L-1: IF L = 0 THEN GO TO 10
50 GO TO 30
```

Line 10 sets the number of lines. Line 20 produces frame sync pulses and line 30 sync pulses and black level. Line 40 produces another frame pulse and line 50 another line.

STAIRCASE PATTERN (GREYSCALE)

Instead of the 55mS of black level on each line, if we had in turn 11mS each of 1.5KHz, 1.7KHz, 1.9KHz, 2.1KHz and 2.3KHz, then a five-step greyscale would be produced. This pattern is of course extremely useful for setting-up monitors.

```
10 LET L = 127
20 BEEP .03,26 : BEEP .03,31
30 BEEP .005,26
31 BEEP .011,31
32 BEEP .011,33
33 BEEP .011,35
34 BEEP .011,36
35 BEEP .011,38
40 LET L = L-1 : IF L = 0 THEN GO TO 10
50 GO TO 30
```

Lines 10 and 20 initiate the sequence. Line 30 produces the line sync pulse, line 31 the black level and lines 32, 33 and 34 the intermediate levels of grey in the staircase. White level is produced by line 35 and lines 40 and 50 restart the program.

Whilst these simple Basic programs produce the desired patterns, the frequencies are inaccurate and the programmes are slow producing delays between each section. Using machine code routines and calling the Beeper subroutine in the Spectrum ROM directly can speed things up immensely and do away with the delays. The machine code is stored in DATA statements in the loading program, as this is the simplest way to input the code without the use of an assembler.

MACHINE CODE PROGRAMS

```
10   REM "BLACK & SYNC"
20   CLEAR
30   LET C = 3636
40   FOR A = 22528 TO 22581
50   READ X: POKE A, X: LET C = C-X
60   NEXT A: IF C<>0 THEN GO TO 120
70   PRINT £ 0; "PRESS ANY KEY TO RUN": PAUSE 0
75   LET L = USR 22528
80   DATA 62, 127, 33, 6, 88, 119, 0
83   DATA 17, 36, 0, 33, 78. 1, 205, 181, 3
86   DATA 17, 45, 0, 33, 6, 1, 205, 181, 3
91   DATA 17, 6, 0, 33, 78, 1, 205, 181, 3
94   DATA 17, 83, 0, 33, 6, 1, 205, 181, 3
109 DATA 33, 6, 88, 126, 61, 119, 183, 32, 229
110 DATA 24, 202
120 CLEAR: PRINT "ERROR IN DATA LINES PLEASE CHECK": STOP
9000 REM FOR SAVING
9001 FOR T = 0 TO 2
9002 SAVE "BLACK & SYNC" LINE 1
9003 NEXT T
```

```
10   REM "STAIRCASE"
20   CLEAR
30   LET C = 6090
40   FOR A = 22528 TO 22617
50   READ X: POKE A,X: LET C = C-X
60   NEXT A: IF C<>0 THEN GO TO 120
70   PRINT £ 0; "PRESS ANY KEY TO RUN": PAUSE 0
75   LET L = USR 22528
81   DATA 0, 62, 127, 33, 80, 88, 119
83   DATA 17, 36, 0, 33, 78, 1, 205, 181, 3
86   DATA 17, 45, 0, 33, 6, 1, 205, 181, 3
91   DATA 17, 6, 0, 33, 78, 1, 205, 181, 3
95   DATA 17, 17, 0, 33, 6, 1, 205, 181, 3
96   DATA 17, 19, 0, 33, 227, 0, 205, 181, 3
97   DATA 17, 21, 0, 33, 200, 0, 205, 181, 3
98   DATA 17, 23, 0, 33, 178, 0, 205, 181, 3
99   DATA 17, 25, 0, 33, 160, 0, 205, 181, 3
106 DATA 62, 0, 61, 50, 80, 88
108 DATA 183, 32, 193, 24, 167
120 CLEAR: PRINT "ERROR IN DATA LINES PLEASE CHECK": STOP
9000 REM FOR SAVING
9001 FOR T = 0 TO 2
9002 SAVE "STAIRCASE" LINE 1
9003 NEXT T
```

Two important points to note are:

1) The routines, once running, do not 'read' the keyboard. Thus they must be saved first when initially typed in by 'RUN 9000'.
2) The programs will not, and can not, be stopped once called.

It is recommended that a low-pass video filter is used between the computer and the transmitter to remove the often present unwanted spurious frequencies produced by computers.

SATELLITE TV RECORD

News has reached us of an amateur television first for the U.K. and the World. On April 12th at 13.46 Ted G6HMS in Lincoln transmitted a Slow Scan picture to Dave G4CUO in Newark. The pictures were sent on 2m and received on 70cm, the clever bit of course, and what makes it a first, is that the signals were via

OSCAR 12.

The satellite, also known as Fuji, was built and launched by the Japanese in August last year, and this is the first television contact through it. Oscar 12 was at the time passing over the Atlantic ocean west of the Azores. This means that Ted's signals travelled a total of approximately 5125 miles before they were received by Dave at an average strength of P4. The contact lasted until 13.52 with the signal strength remaining constant throughout.

There was no special equipment in use during the QSO, Ted's transmit power was 10W into his normal aerial with no elevation control. The output power of the satellite is about 700mW from the 70cm transponder. The tracking, best time of contact and doppler shift calculations were provided by Dave who has been tracking the satellite since launch. The pictures originated from a Spectrum computer using the G1FTU program in the 8-second mode.

Since this record contact was made the world seems to have woken up to the fact that Oscar 12 is there and operational, and Ted is now much in demand. He has successfully worked stations in the U.K and Italy, and at the time of writing 'skeds' were being arranged with American stations.

For further information on Oscar 12 and satellite working in general, please send a large SAE to Ron Broadbent G3AAJ, Amsat UK.

TV REPEATERS .....

The definitive list

Editors

Since there is rather a lot happening on the repeater scene lately we thought it best to extract the information from its usual spot in 'News Roundup' and print it here instead.

GB3HV in High Wycombe was finally licenced in mid April after a VERY protracted period. One of the main reasons for the delay was the fact that it requires frequencies other than the usual RMT-1 and 2 in order to avoid local radar problems and the resulting new channel - RMT-3 - is detailed below. The repeater is currently in full operation.

GB3AF, Newcastle-on-Tyne in County Durham was also licenced in mid April and should also be in full repeat mode by now.

GB3ZZ (Bristol) was licenced just before the convention in May. It went on the air in May and had an 'official' opening on June 2nd.

GB3RT - Rugby - had the acknowledgement of its licence application from the DTI dated April 14th. Everything appears to be going smoothly with this one and a licence is confidently expected any time now. The receiver/logic system has completed its prolonged site tests satisfactorily and the transmitter started manned site tests, at full power, on May 28th. These have also gone very well and the group are therefore confident of an 'instant' switch-on as soon as the licence is issued.

The Rugby group organised a bring-and-buy stand at the Crick show this year to raise funds and it made enough to pay for about three quarters of the hardware needed. Many thanks to all those who helped and those who patronised the stand.

GB3TV - Dunstable Downs - went to full power operation on the 30th May. This is expected to provide an extra 6dB signal strength over the previous system.

GB3GV - Leicester. This one suffered a lightening strike in April which took out the transmitter PA and receiver. Unfortunately there are some personnel problems with this one and it is not certain when normal service will be resumed.

CQ-TV has put together a current ATV repeater list for your giudance. Also, for those of you who are not conversant with the modes and frequencies used in the U.K., brief details of these are listed below.

For further information about any of the repeaters please contact the stations listed in the table. Remember, all repeaters now operational in the U.K. are built, operated and maintained by Amateurs, and as such require financial support to ensure their continued operation. Should you wish to offer your support, either financial or practical, or both, to any of the above you should contact those listed who will be only too pleased to talk to you.

U.K. ATV REPEATER STATIONS LICENCED SO FAR:

CALL SIGN	LOCATION	CHANNEL	CONTACT
GB3UT	BATH	RMT-1	G4JQP
GB3VI*	HASTINGS	RMT-1	G3ZFE
GB3CT	CRAWLEY	RMT-2	G4ZPP
GB3GT*	GLASGOW	RMT-2	GM1FGO
GB3GV	LEICESTER	RMT-2	G4EUF
GB3PT*	CAMBRIDGE	RMT-2	G8XMS
GB3TV	DUNSTABLE	RMT-2	G4ENB
GB3UD	STOKE-ON-TRENT	RMT-2	G4DVN
GB3VR	BRIGHTON	RMT-2	G4WTV
GB3AF	NEWCASTLE-UPON-TYNE	RMT-2	G1FBY
GB3HV	HIGH WYCOMBE	RMT-3	G4CRJ
GB3ZZ	BRISTOL	RMT-2	G8VPG

(* Not yet operational at the time of going to press.)

REPEATER APPLICATIONS AWAITING LICENCING

GB3ET	EMLEY MOOR	RMT-2	G8CJS
GB3NV	NOTTINGHAM	RMT-2	G8BWC
GB3RT*	RUGBY	RMT-2	G6IQM

(* Application with the DTI.)

Input and output frequencies for the three channels at present available in the U.K. are as follows:

CHANNEL	I/P MHz	O/P MHz
RMT-1	1276.50	1311.50
RMT-2	1249.00	1318.50
RMT-3	1248.00	1308.00

Repeater stations on RMT-1 will accept either AM or FM signals, whilst inputs on RMT-2 and RMT-3 are in FM only. Repeater output on RMT-1 is AM only, and the outputs on RMT-2 and RMT-3 are FM only.

Repeater video identification is standard 625 line Fast-Scan TV (system I), with negative going video and positive going syncs. A morse code ident is also present on the 6MHz audio carrier detailing callsign and location. FM transmissions are limited to a maximum peak deviation of +/-6.5MHz and they can employ CCIR pre-emphasis as an option. The intercarrier sound subcarrier is at 6.0MHz and repeater access is by the presence of a standard 625-line video signal at the input.

Although the actual coverage of each repeater will depend on local geography, and in some cases aerial directivity, the average area covered is in the order of a 30km radius from the repeater. Apart from one or two exceptions aerials are omni-directional. ALL ATV aerials operate horizontally, regardless of band.

If any of the above information is incorrect, either of the Editors would be glad to know so that the details can be kept up to date. This list will be updated and reprinted periodically in CQ-TV.

CONTEST NEWS

By Mike Wooding G6IQM,

I am pleased to report that the rebuild of my shack after the move to this QTH has been completed and, much to the probable annoyance of many of you, I have been very active during this year's contests. Any of you subjected to my odd comments, thrown in at will during the contests, have my apologies. Any of you as yet not in receipt of the same, just point your beams at Rugby during the next contest!

I thank you for the letters received recently and wish to answer a few of the more sensible points raised. It appears that my often peculiar sense of humour inspires many of you to similar depths...keep it up! Peter G1COI raises the question of crowded channels during contests and suggests that we QSY to USB working. I don't agree with the frequencies that you suggest Peter, but why not remember that 144.170 is a recognised ATV calling frequency on the continent, so let us use it also. Andy G8LIR wants to know if in the results lists I can include more details such as aerials used etc. Whilst this may be of interest to some it does take up a lot more magazine space. What I will do however, is to give details of the winning station's operating conditions and equipment.

A little snippet of late news that I think you may find interesting: Robert Platts G8OZP is now fully operational on 3cms. The equipmant - you may have seen it displayed at the convention - was air tested recently with excellent results. So, don't forget, he is threataning to be QRV during the contests, look out for him and get building.

WINTER CUMULATIVES

The Winter Cumulatives were well supported and the level of entries received very good. I am pleased to be able to congratulate you all again on the high overall standard of operating. In general, on the four nights of the contest, conditions were not particularly inspiring. Typically, the last session on Sunday Feb 1st was preceded on the Saturday by one of the best lifts seen on 24cm for a long time. This, however, faded into obscurity by the time the contest started the next day. The regular (some might say plain daft) portable stations were much in evidence, drunkenly shivering their way through the murk of winter to astound us with their mountaineering skills. (Quite poetic that what?). As reported in the last issue, one of the most memorable exploits was of course the infamous 'LIR team of Andy, Fred and Ron going /mobile on the last leg of the contest as G4GCO/M. (It is here that I owe an apology for a mistake in the last issue, when I incorrectly gave the call sign as G4HCO, sorry Fred but the G is

next to the H on the keyboard!). Their operating conditions consisted of a five element beam on a stub mast protruding through the sun roof of the car, using strong arm rotation. The vision source was a portable VCR with the output of the transmitter monitored on a portable oscilloscope. Locators were previously worked out for every major junction. Their efforts and operating expertise, as they travelled from Manchester to London and back again cannot be praised too highly. I know that I speak for you all when I say Thank you lads for all the enjoyment you gave us and keep up the good work.

EASTER EXTRAVAGANZA

This contest was also well supported on the air, but not as far as the entries are concerned. Here in Rugby it seemed at times as if everybody and his brother were transmitting at the same time! At the stroke of midnight as Monday became Tuesday, G4WRA/P gave a CQ call and we were off, although I must admit that 30 minutes later yours truly was heading up the wooden hill! Back again at 9am and guess what, the first station I heard was G4WRA/P, but they assured me that they had been off air for a few hours, such dedication! The weather was very good and even in the rarified atmosphere of our high flying portable stations the sun shone (eventually) and all was well. Conditions were pretty average despite the high pressure area over the country, but some good contacts were made. Special mention must be made of Tony G1HOV who, having lost his aerials in the March gales, worked the entire contest using a 2metre beam on 70cm, with some quite suprising results too. Also a mention for the average video group (sorry lads I couldn't resist it) G0AVG for what must be the worst set of contest numbers I have ever seen...9867...come off it, I have only got ten fingers, almost worth a special award!

Ok then onto a few of your comments and one off-air comment that just will not lie down!:

G1COI/P 'did you know that sheep continue to say baa at midnight'
GW8VZT/P 'us old codgers are getting too old for these 24 hour contests'
G0AVG/P 'oh good, the mist has cleared, I can now see the triangulation point 100 yards away'
And this one, heard after the Mayday microwave:
????? 'I really thought I was going to score with Viv, GW1IXE/P' !!!!! (anon)

RESULTS

Once again I have the pleasure of congratulating the G8LIR/P team of Andy, Fred and Ron for winning the 70cm section of the Winter Cumulatives. Perched on one of their favourite portable sites at Hailstone Hill just north of Rochdale, Lancs, they managed to work just about everybody. They operated from the caravan, a now permanent feature of their contest equipment, with two phased 21 element Tonnas. To enhance the transmit signal a single 4CX250 amplifier was used and to improve reception a cavity filter reducing co-channel interference and noise helped a great deal.

Having initiated this idea of giving more details of the winning station I suppose I must continue, especially as it's the boss that won the 24cm section! John G3YQC worked the contest using his newly completed transmitter as reviewed in CQ-TV 138. With the 15W output into his quad loop aerial John managed some very nice contacts, once again making a two way with G4CBW in north Lancs. The receive set up is a Wood and Douglas receive converter and demodulator, with interdigital filters and bipolar pre-amps. Congratulations John and I enjoyed every minute of it.

By way of explanation for the last entry in the table for 24cm, if you send me an entry then I will publish it! Well done Peter G1COI.

The address for entry forms, log sheets, information and contest entries is shown below. Don't forget that every entry receives a certificate provided that a large (minimum A4) SAE is included.

Mike Wooding, 5 Ware Orchard, Barby, Nr.Rugby, Warks, CV23 8UF.
Tel: 0788 890365.

WINTER CUMULATIVES 87 70cm

Posn	Call	Points	Contacts	Best Dx	@	Km
1	G8LIR/P	22292	101	G4HMG		313
2	G3NNG	16715	104	G8LIR/P		230
3	G8MNY	13902	69	G8LIR/P		299
4	G4ZJY	9663	95	G8MNY		222
5	G4CRJ	7835	63	G8LIR/P		250
6	G6YKC	7139	52	G8MNY		195
7	G6HMS	7073	61	G8MNY		208
8	G8BWC	6057	65	G8MNY		204
9	G6IQM	5867	46	G8LIR/P		162
10	G3YQC	5825	47	G8LIR/P		162
11	G1COI	5781	40	G8LIR/P		238
12	G4VTD	4921	50	G8LIR/P		294
13	G4EUF	3613	35	G8LIR/P		127
14	G8DIR	2430	36	G8LIR/P		120
15	G4GCO/M	2339	28	G3NNG		102
16	G8PX	1862	20	G8MNY		98
17	G8ONX	1785	32	G3NNG		84
18	G4WGZ	1616	30	G3NNG		119
19	G3NAQ	1322	18	G4DVG		109
20	G2BMI	697	13	G6UNT		38

WINTER CUMULATIVES '87 24cm

Posn	Call	Points	Contacts	Best Dx	@	Km
1	G3YQC	1325	14	G4CBW		107
2	G4CRJ	914	10	G4WGZ		62
3	G4EUF	837	10	G4CBW		79
4	G4VTD	774	11	G8GKQ		138
5	G6IQM	628	10	G4DVN		96
6	G4WGZ	92	7	G4CRJ		62
7	G1COI	0	?	?		?

EASTER EXTRAVAGANZA '87 70cm

The victory garland goes out to the team of Andy, Bill (he is BIG!), Harry, Simon, Andy and Simon, who operated as G4WRA/P from their site at Broadway, near Evesham. The equipment used would create too long a list (see photograph), there are caravans full of it! The aerial array comprised 4 x 24 element Parabeams mounted onto a mobile tower.

Posn	Call	Points	Contacts	Best Dx	@	Km
1	G4WRA/P	7394	54	G8GKQ		183
2	GW8VZT/P	7133	40	G4GCO		163
3	G1COI/P	5766	31	G8GKQ		214
4	G0AVG/P	4845	35	G1COI/P		186
5	G4JBU/A	3591	43	G4GCO		126
6	G6SKO	2749	32	G1COI/P		178
7	G1GST	2618	23	G1COI/P		118
8	G6IQM	2259	23	GW8VZT/P		136
9	G4EUF	1906	18	G1COI/P		139
10	G8GKQ	1653	7	G1COI/P		214
11	G8ONX	1544	22	GW8VZT/P		120
12	G8MNY	1446	12	G4WRA/P		142
13	G3YQC	1303	12	GW8VZT/P		136
14	GW6DQY/P	1293	9	G4WRA/P		129
15	G4ULS	1168	11	G1COI/P		105
16	G1WRA/P	492	5	GW8VZT/P		100
17	G1HOV	461	11	G4WRA/P		47

ATV INCLUDED IN RSGB 10GHz CUMULATIVES

For what is believed to be the first time, the RSGB have included a section for fast-scan TV in this years 10GHz cumulative contests. Details were given on page 206 of the March RadCom although it is a pity that BATC were not informed of this beforehand, so that it could be included in the last CQ-TV. Unfortunately, by the time you read this the first four legs will probably have already taken place. There are however two legs left which you should catch so (for completeness) here are all the contest leg dates: 12 April, 10 May, 21 June, 21 July, 9 August, 13 September. Times for each leg are 0900-2100gmt. Please let CQ-TV know how you get on.

CONTEST CALENDAR

INTERNATIONAL ATV CONTEST
1900Hrs SATURDAY SEPT 12th ---- 1300Hrs SUNDAY SEPT 13th
70cm and 24cm FAST SCAN

AUTUMNVISION 87
0001 to 2359Hrs -- SATURDAY OCT 25th
ALL BANDS --- ALL MODES

LET'S BUILD A REPEATER

By John Wood G3YQC

Now that ATV repeaters are gaining a firm foothold in the U.K., I thought it was about time that CQ-TV started investigating the hardware required for a typical repeater station. This then is the first of a series of articles intended to present practical information and designs in order that potential repeater groups can not only see what is involved and whether they feel competent to tackle such a project, but also to provide design information from repeaters which are already in use.

Most groups start by building the transmitter first so I shall follow suit and describe a high quality repeater transmitter, which conforms to the laid down repeater specifications, and which has been specially developed for TV repeater service. This transmitter was developed by myself, from a system described in the last issue, for our local repeater project GB3RT.

THE CONCEPT

The "Specification for a 1240/1325MHz band television 'repeater' station" states: "Carrier frequency stability will be maintained within +/- 5.0KHz to the nominal carrier frequency at the operating temperature range to be experienced on site". This order of stability might be quite difficult to achieve when using a free-running signal frequency oscillator, therefore I reasoned that the best approach would be a crystal mixer type transmitter. Fig.1 shows the block diagram of such a transmitter and shows the frequencies used at GB3RT.

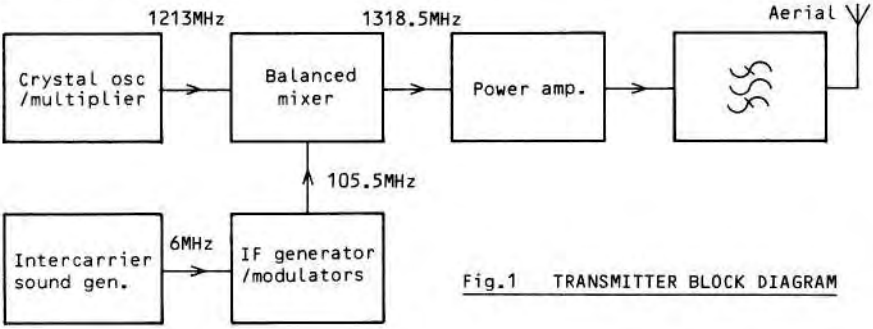
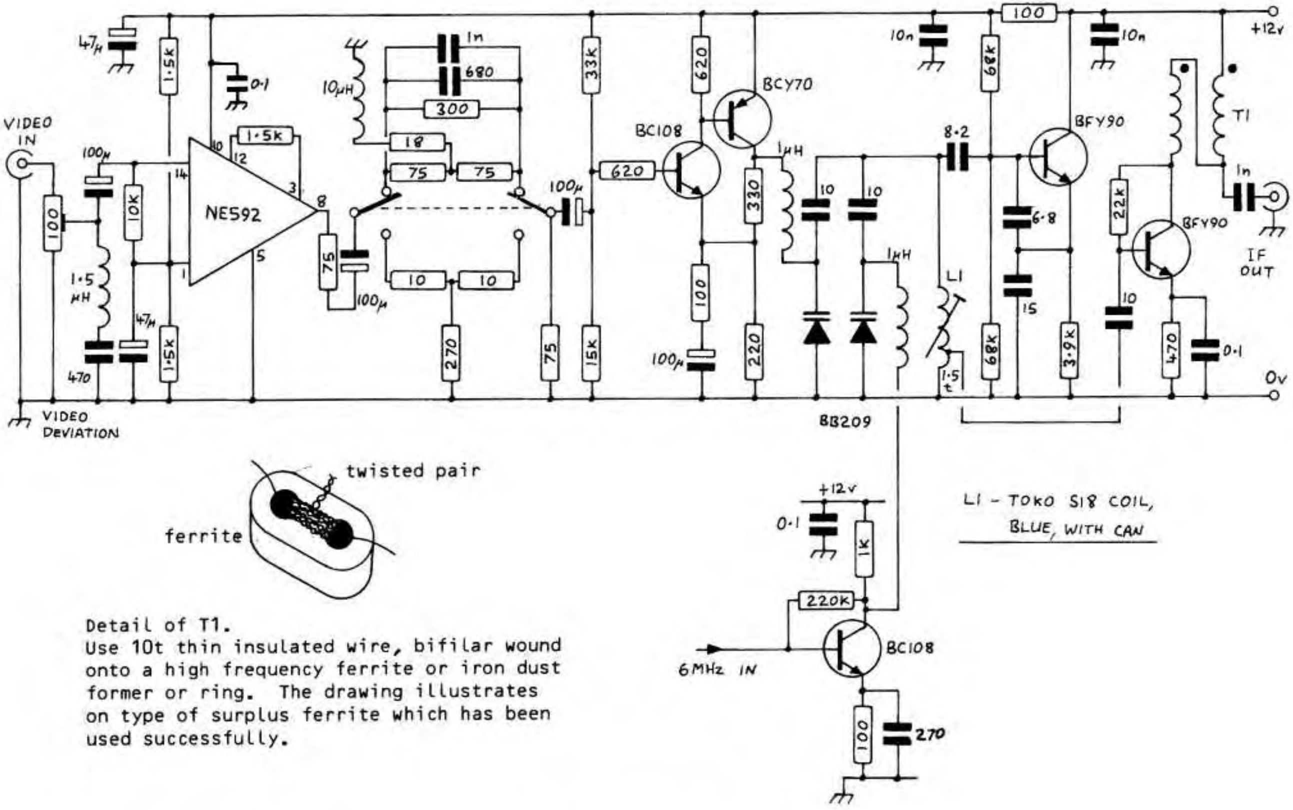


Fig.1 TRANSMITTER BLOCK DIAGRAM

THE IF GENERATOR AND A/V MODULATOR

The IF oscillator is based around a 70MHz design developed for an early version of GB3GV and which was published in CQ-TV 132. The design has proved so successful and repeatable that I have used it as the basis for this unit.

If you examine the original circuit you will immediately notice two significant differences from the one shown here in Fig.2. The first is that a fixed gain video amplifier is used to amplify the incoming video to a level suitable for overcoming the losses in the pre-emphasis circuit and for driving



Detail of T1.
Use 10t thin insulated wire, bifilar wound onto a high frequency ferrite or iron dust former or ring. The drawing illustrates on type of surplus ferrite which has been used successfully.

Fig.2 IF GENERATOR AND A/V MODULATORS

the 'modulation' amplifier. Video at around 1v p-p is applied to a 100-ohm preset which terminates the line. The signal is taken from the slider and this control is thus used to set video deviation. It is of course possible to provide a variable gain control on the NE592, however, this was not considered necessary in view of the fact that an input termination was required anyway. A fixed gain set resistor (1.5k) is used in this design although different resistors may be substituted to provide more or less gain as required. A table of gain versus gain set resistance may be found in CQ-TV 132 p54.

The NE592 amplifier was chosen for several reasons: it is well known to me and readily available, its gain can be adjusted to handle most levels of input signal which might be used in the future, it has a flat response over the video range, and the facility exists to invert the video if this ever became a requirement in the future. (well it doesn't hurt to be prepared, does it?). A 75-ohm output impedance is defined by a resistor and this matches the signal into a CCIR pre-emphasis network. I have provided a switch here so that the emphasis can be switched out if needed, but this is only intended for engineering, experimental and initial commissioning purposes. However, to approximately equalise the deviation levels whilst changing between 'in' and 'out' I have included a resistive pad as well.

Video from the emphasis network is terminated by a 75-ohm resistor and connected to the input of a wideband feedback amplifier. This amplifier has a flat response to well past the highest frequency anticipated in a video signal. The video signal is then applied to its varactor diode via a 1uH choke which serves to prevent RF feeding back into the video amplifiers. A fixed DC bias level is maintained at this point to ensure that modulation only takes place on the linear part of the diode's characteristic curve.

Here we depart from the original circuit again. You will notice separate varactor diodes now to cater for both vision and sound signals. Although the usual method of mixing a sound subcarrier with the baseband video works quite well, it nevertheless has several technical drawbacks, not the least of which is the fact that an adjustment to one signal will invariably have an effect on the other. The 'correct' (or should I say broadcast or professional) way of modulating is to provide two separate diodes. This not only reduces the complexity of the waveform which one diode alone has to cope with, but also means that separate adjustments to the two signals are possible without interaction.

A fairly standard Colpitts oscillator, using a high frequency BFY90 transistor, generates the actual IF carrier frequency. The use of a Toko coil, with a screening can, and a careful choice of oscillator components ensures that the module built for GB3RT stays within the required frequency drift limits (after a one-hour warmup period) over a temperature range of -5 to +30 degrees centigrade (when fitted in its final enclosure). The carrier signal is lightly coupled to a buffer amplifier by a tap close to the earthy end of the coil and a 10pF capacitor. The buffer amplifier uses a wideband transmission line transformer at its output in order to preserve adequate bandwidth for the wide signal. (see also CQ-TV 132).

A 6MHz sound modulated subcarrier is also fed into this module which is buffered before being applied to the sound modulator diode. Again a DC potential is provided to ensure linear modulation onto the main carrier.

THE SOUND SUBCARRIER GENERATOR

I had a lot of trouble in deciding what to use for this part of the transmitter. At first I built a 'traditional' system which is presently in popular use by TV amateurs on 24cm. Although this has always worked fine I nevertheless decided, in the interests of accuracy and quality, to check it out on some test equipment.

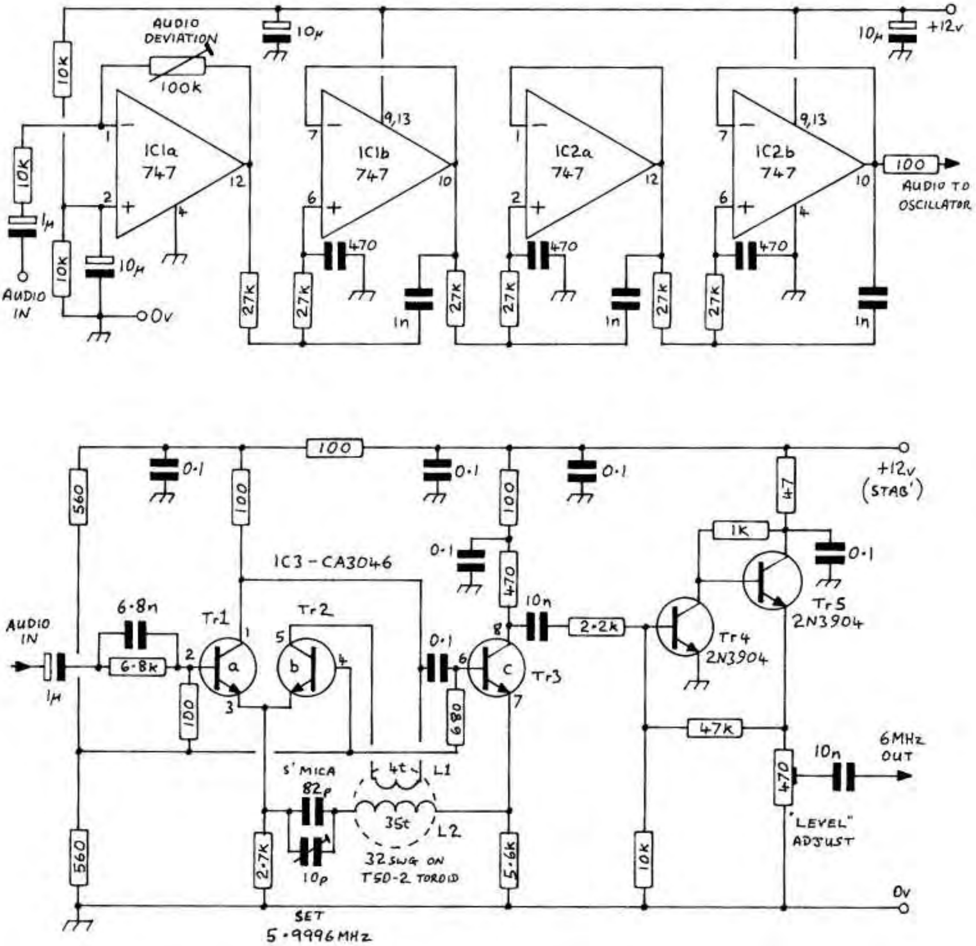


Fig.3 AUDIO PROCESSING AND 6MHZ INTERCARRIER GENERATOR

The first thing I found was that the 6MHz carrier from the Colpitts oscillator was anything but a pure sinewave. I spent a week trying to modify the circuit and, although I gained some improvement, I was unable to get a really decent sinewave out of it. Then I measured the audio distortion on a Racal automatic modulation meter. I'm afraid that the result there was a distortion factor of almost 15% at the required deviation frequency! I concluded that this had not been noticed before because (a) we only use speech and (b) we tend to assume that our sound demodulators are not quite up to scratch!

I built an FET oscillator which produced a good sinewave and then looked into the distortion problem. Try as I may I could not get it better than about 8% or so using a varactor diode. I tried everything: many different varactors, several ways of driving, different fixed bias and dozens of capacitor combinations. Although I considered that the resulting circuit would probably be acceptable (especially as we are only supposed to use speech) I was nevertheless not satisfied and looked further.

Through all the above investigations I had the help and advice of my good friend and colleague Roland Hall, G0GSA. and it was here that he had an inspiration. Apparently he had spotted in some journal or other an oscillator circuit which could be frequency modulated over a wide range, did not use a varactor diode and was stable and particularly distortion free. He went away and emerged from the lab with a prototype of the oscillator shown in Fig.3.

Tr1 and Tr3 form an emitter coupled oscillator. A portion of Tr1 current flows through Tr2 and L1 producing a magnetic flux which reduces the effective inductance of the resonating coil L2. A voltage applied at the modulation input will vary the current in Tr1, Tr2 and L1, thus the frequency will change.

We immediately realised that the circuit was capable of high deviation at low distortion, and subsequent measurements confirmed this. The prototype produced +/- 50KHz deviation for 1v RMS audio input, but the deviation sensitivity can be increased by increasing the number of turns on L1 from 4 to 5 or more.

The specification achieved on the oscillator prototype was as follows:

RF OUTPUT	Variable up to around 3.5v p-p. Lowest load impedance (at maximum output) - 220ohms.
Distortion	2nd harmonic -30dBc 3rd harmonic -50dBc
MODULATION	
Sensitivity	1v RMS AF in at 1KHz gives +/- 48KHz deviation 0.5v RMS AF in at 1KHz gives +/- 24KHz etc.
Distortion with 1KHz tone	@ 25KHz - 0.15% @ 50KHz - 0.45% @ 75KHz - 1.0%
FREQUENCY RESPONSE +/- 50KHz deviation	LF end - to near DC but limited by 1uF capacitor. measured - 0.6dB @ 50Hz, ref 1KHz (0.5% distortion) HF end - measured - 0.2dB @ 20KHz (1% distortion)

The final circuit, including audio processing, is shown in Fig.3.

Audio input from the repeater's A/V switching system is fed to an operational amplifier whose gain has been made adjustable in order to provide a deviation control. The gain of this amplifier may be altered to suit other input levels by changing the value of the preset. It was considered desirable to restrict the audio frequency response to around 6KHz, this to allow good quality audio but without retaining the risk of very high frequencies (eg. from digitally derived audio) increasing the deviation too much due to the action of the pre-emphasis circuit. Initially only two simple filter circuits were used, however, in the final version it seemed reasonable to use two dual op-amp chips so the third (spare) amplifier was made into a filter as well.

The resulting audio is fed to a passive pre-emphasis network conforming to the recommended broadcast specification (50uS time constant). However the network doesn't start becoming effective 'till around 1KHz, so at 6KHz the deviation has still not risen very much. It was included however so that the response matched the corresponding de-emphasis networks built into domestic intercarrier sound demodulators.

The oscillator output level is made variable so that deviation of the main IF carrier may be adjusted if required.

The oscillator itself is constructed around a CA3046 transistor array. The use of complementary transistors and the fact that they are in the same package ensures best frequency stability. Although there are some transistors remaining in the package which could have been used for the output amplifier, I used separates simply because the resulting PC board layout got quite messy otherwise.

Be sure to use well regulated supplies to each of the above modules. They are both voltage sensitive, especially the sound module.

CRYSTAL LOCAL OSCILLATOR/MULTIPLIER

This is a new design by G4DDK which was described in 'Radio Communication' magazine for February and March 1987. It is ideal in this application since it supplies a particularly clean output signal and has sufficient output (better than +10dBm) to drive the transmit mixer.

Since boards were not available at first, the unit built for GB3RT used a home made PC board to the pattern illustrated in the article. I am pleased to say that it worked first time although the required output level could not be achieved. I put this down largely to the fact that I was probably using a different type of board material from that used in the prototypes. I was however easily able to obtain the necessary output power by simply raising the value of the 2.2pF base input capacitor for Tr4 to 5.6pF.

A printed circuit board is now available from RSGB headquarters, although it is just possible that the BATC may be holding stocks in the future (check the latest Member's Services order form). The special 'sky' trimmers, transistors and coffin (trapezoidal) capacitors are available from Piper Communications of Didcot in Oxon.

USM-3 TRANSMIT MIXER

The transmit mixer - USM-3 - was built from a commercial kit available from Piper Communications. The unit is specified to deliver at least 1W output, although on the two built by myself I have actually achieved over 1.5W. The USM-3 is particularly suited to wideband TV operation as it employs a wideband input circuit rather than the more usual tuned input.

Although fairly conventional striplines are used in the RF amplifiers, I found that the overall bandwidth is sufficient to allow a 20MHz wide signal through with only a small amount of signal falloff at the band edges. A particularly useful feature of this mixer is that a preset control is provided which acts as an IF input attenuator. This controls the final power output level and makes it easy to set the exact output power required to stay within the 25W ERP limit imposed by the licence. The mixer is supplied complete with a custom box and connectors and has already proved itself to be an excellent performer in FM-TV service.

The only point to mention regarding construction is that the PA transistor is supplied with a small strip of aluminium to act as a heatsink. Whilst this is undoubtably sufficient for SSB use we will be running close to full power permanently, therefore a new heatsink must be constructed that is large enough to maintain the PA transistor stud at a reasonable temperature at all times. Probably the easiest is to fabricate a heatsink from a small piece of copper sheet. Fig.4 shows the method adopted at GB3RT. The large flat area is screwed against the inside end of the box in such a position that the tab sits squarely onto the transistor boss. If screw slots are cut to enable the position of the heatsink to be adjusted, there should be no need to fit the transistor nut, since to do so may put a strain on the stud. Using this method the majority of the heat is conducted away through the tin box itself and subsequently into the cabinet in which it is fitted.

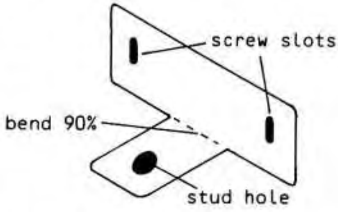


Fig.4 DRIVER HEATSINK

POWER AMPLIFIER

A suitable power amplifier is the wideband RF power module described in the last issue of CQ-TV. You should ensure that adequate heatsinking is provided as the unit tends to run rather hot.

BANDPASS FILTER

This is the ubiquitous 3-pole interdigital type as described in CQ-TV 120 and 'The Best of CQ-TV'. For use at the repeater output frequency the lines themselves should be made about 2mm shorter than those shown.

TRANSMITTER ENCLOSURE

It is important to try to keep RF radiation from the transmitter itself to an absolute minimum so that isolation between it and the repeater receiver may be maintained. We have enclosed our complete transmitter in a large diecast box (Electromail (RS) reference 501-878). It is important to keep the number of input connectors etc. to an absolute minimum and to filter the DC power input. GB3RT uses a BNC socket for the video input, a feedthrough insulator for the audio (don't trust those small plugs and sockets!) and a heavyish feedthrough capacitor for the DC.

DC power is split inside the box and both the PA and the rest of the modules are fed through their own pi filters, this helps to keep the risk of interaction to a minimum (see Fig.5). The bandpass filter should be mounted flush against the inside of the enclosure with its coaxial connecter protruding through to enable the aerial connection to be made. It is important to make this mounting a good fit so that no slits or gaps can allow the free passage of RF.

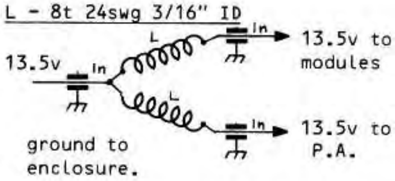


Fig.5 PI POWER FILTERING

Since it is anticipated that anyone contemplating the construction of a TV repeater will be technically well versed in the subject, detailed contruction information has not been given here. There is of course no reason why enthusiasts should not adopt a similar approach to this for their own transmitters and I would be pleased to eloborate over the phone if necessary. It is certain that the system described has a far better performance than anything I have so far encountered in the amateur TV field. Several independent off-air reports from GB3RT's site tests have indicated that the picture and audio quality is of the highest quality and has been compared favourably with broadcast satellite transmissions by those able to make comparisons.

Next time I hope to describe a simple repeater logic control system (not computerised) together with a morse code ident generator and a new, improved sync detect circuit.

I would be very interested to hear from any repeater groups who have circuits and designs which they feel would be of interest to future TV repeater designers and which could be published in this series. It is always nice to have a choice.

Narrow Bandwidth TeleVision Association

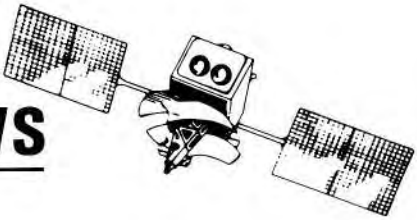
The NBTVA, founded in 1975, specialises in the mechanical and low definition aspects of ATV and offers genuine (moving) TV within a basic bandwidth of 6 - 7KHz.

The techniques, basically an updated form of the Baird system, are a unique mixture of mechanics, electronics and optics.

Membership is open world-wide on the basis of a modest yearly subscription (reduced for BATC members) which provides an annual exhibition and quarterly 12-page newsletters, together with other services.

For further details write to: Doug Pitt, 1 Burnwood Drive, Wollaton, Nottingham, NG8 2DJ or telephone Nottingham (0602) 282896.

SATELLITE TV NEWS



by Charlie Suckling G3WDG

PROGRAMME NEWS

Few changes in programming have occurred over the last few months. The only significant happening was the allocation of EUROPA's old transponder to the German arts channel 3-SAT, which is now much stronger (it used to be on an East Spot transponder).

Pop music fans are looking forward to the appearance of the American channel MTV, rumoured to be coming on INTELSAT V in the autumn. INTELSAT watchers may have spotted BBC-1 again on 11.175GHz, with normal subcarrier sound and scrambled video. The video was inverted, with large blobs appearing on an otherwise stable picture. Does anyone have any information on this system? It was quite interesting to watch the satellite and terrestrial signals simultaneously, with the time delay on the satellite signal causing quite interesting effects.

The scrambling issue has raised its ugly head again with more rumours about Premiere. We shall have to wait and see. FILMNET changed their scrambling system a month or two ago to include frame inversion on alternate lines. This seems to have caused a lot of embarrassment to pirate decoder manufacturers (tough!). Buyers of such units (sometimes called video filters or sync processors should beware as it seems that FILMNET have more such schemes up their sleeve! SKY CHANNEL has been seen unscrambled in recent history but went back to normal shortly afterwards.

POLARISATION ROTATION

One of the main nuisances with satellite TV is the need to go out to the dish every time you want to change polarisation to watch the other set of channels on a given satellite. devices called polarotors (polarisation rotators) are being advertised by a number of importers now, which enable this to be done remotely. The units normally include a scalar feed horn (for 0.3 - 0.4 F/D ratio front-fed dishes) and a circular-to-rectangular waveguide transition using a wire loop. Polarisation is changed by rotating the wire loop with a servo motor. Polarotors thus replace any existing feed, the LNB being bolted to a waveguide flange on the polarotor.

Some users have reported less than ideal results when changing from a conventional feed to a polarotor. The problem seems to be one of bandwidth, where the device works well over one part of the band but poorly elsewhere. For example, PREMIERE may be good while SUPERCHANNEL is poor. One unit which does have full band performance is available from Lenson heath Ltd (Tel: (06285) 25887). It is connected to the indoor receiver by a 3-wire line (ground, +5v and 'pulse').

The control signals are normally provided by the indoor receiver. A simple circuit to provide the 'pulse' signal has been developed by Stuart Jones, GW3XYW for home constructors. A single pot is used to control the polarisation angle. A useful modification would be to switch between two presets (to set horizontal and vertical).

FINALE

I am currently compiling a video of satellite stations' logos and theme tunes, and would be very grateful for the loan of any recordings of TEN - the movie channel which went off the air before I acquired a VCR!).

IN RETROSPECT

CQ-TV 138 - 24cm - WHAT GEAR?

Page 68, under the subheading 'AERIALS', first paragraph, last sentence SHOULD read: "All amateur TV is HORIZONTALLY polarised (including TV repeaters at present". Hope not too many of you put up the new aerial incorrectly! - sorry.

The 'Comex' TVRO/24cm receiver board is no longer available. The Astec modules may be obtained from Satalite TV Services, P.O.Box 26, Worksop, Nottinghamshire S80 1XW.

CQ-TV 138 - THE SIMPLEST PATTERN GENERATOR

Pin 12 SHOULD be connected to pin 7. The Vss (ground) connection is pin 8 and not 12 as shown.

'THE SLOW-SCAN COMPANION'

G3WCY digital scan converter

Page 60 stated that certain component changes have been made on the drawings. This seems not to have been done so I shall try to remedy that by listing those which I can find at the moment.

Fig.1 - Use 'LS series IC's only where shown. It may be necessary to increase the value of R148 to 1k. C117 polarity is shown reversed, the '-' should connect to the base of TR103. C118 is NOT a polarised component.

Fig.3 - The two monostables IC23 and 31 may need their timing capacitors (100pF) reducing to around 68pF to achieve the correct duration pulse.

If anyone has any further such information I should be pleased to hear from you.

Page 64 fig.14

IC1 is a SL6270 and IC2 a 741 op-amp.

G4ENA transmit converter - p69 (also CQ-TV 129 p.10)

Dave Robinson, G4FRE, suggests that S12, on the switching and interconnecting diagrams, should be labelled inversely.

IN FRONT OF THE TUBE

Part-7

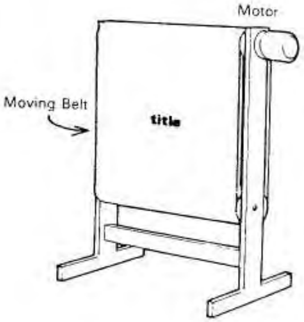
By Peter Delaney G8KZG

So far we have looked at lenses for television, (parts 1, 2 & 6), colour separation systems, (part 3), optical special effects, (part 4), and lighting (part 5). To compensate for the rather theoretical topic from part 6, here are some practical ideas for captions to put in front of the lens, 'in front of the tube'.

To many, the obvious way to produce captions on the screen is to use a suitable computer program. This can produce some interesting results - not all of which are intended!! The computer may produce RFI - one popular model does this very neatly on 144.75MHz. Almost all home computers cannot be genlocked to the station sync pulses, although some can be modified to do so. Unless all picture sources are locked together in time, of course, they cannot be mixed, faded or superimposed sensibly. In addition, the output of the computer will need a video bandwidth filter to reduce the signal risetimes - this is desirable for any application and essential if the signal is to be fed to a transmitter. Anyway, computers do not go 'in front of the tube', so are outside the scope of this series.

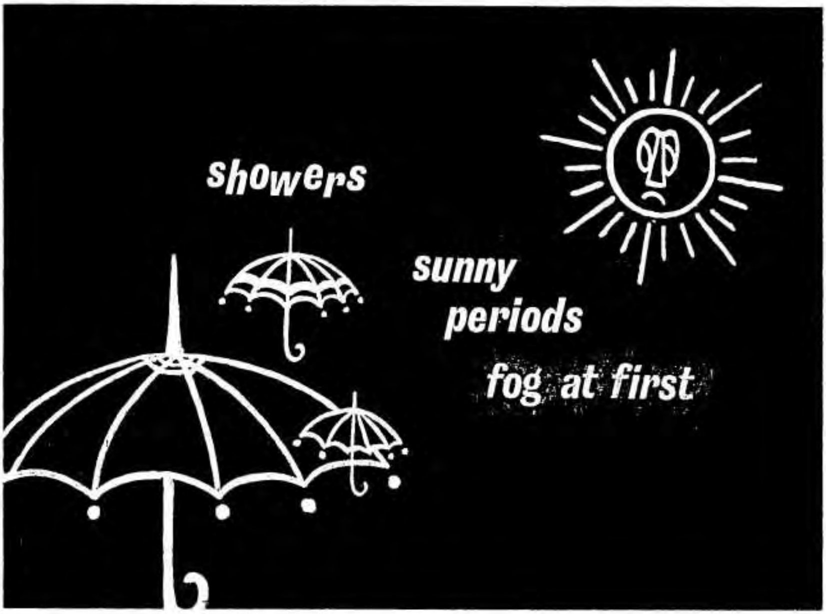
The simple solution is to dig out that old monochrome camera that was consigned to a back corner when the latest 'does it all' colour model was obtained. The camera is mounted to face the caption cards which are lit as evenly as possible from both sides (see part 5 in CQ-TV137). It is helpful if the camera accepts external sync pulses, so that it can be locked to other picture sources. The frame circuit is usually easy to modify, as in most simple cameras it is locked to the mains supply. The frame sync needs to be connected in place of the AC at this point. The line circuit may need a little more thought, but can usually be triggered by an appropriate direction pulse at line timing.

So, how are these captions created, and how can they be animated? Normal captions are called '12 by 10s', as that is their size (in inches). The actual picture area is 10.5" x 8". It is best to standardize on this size, as the camera lens will not require constant adjustment and commercial test cards - such as the Marconi Resolution Chart - will fit the system. The captions are made with white lettering on a matt black card as the background. By using a matt black background, reflection of stray light (such as happens with glossy paper) is minimised. The lettering can be done using Letraset or 'painted' using white typewriter correction fluid. As a guide, the letters should be no less than a twentieth of the screen height (about 30pt), and should be much larger if the caption is to be transmitted over a difficult path. It is best, of course, to pencil out the picture or rule lines for the text before you start. As an alternative method of designing



Roller type

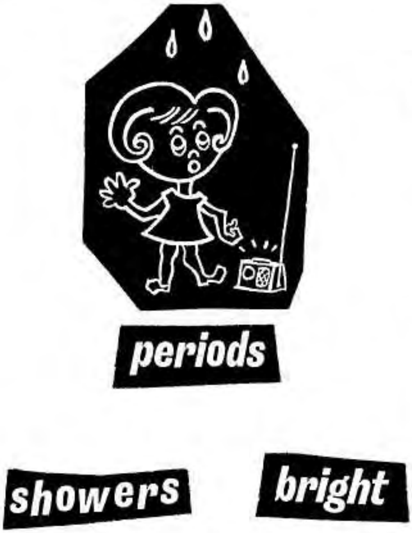
the caption, the various elements can be lettered or drawn onto black paper or thin card and then pasted onto the base card. If the caption is to be used quite often, then it is worth mounting it onto hardboard or thicker card for protection and greater rigidity.



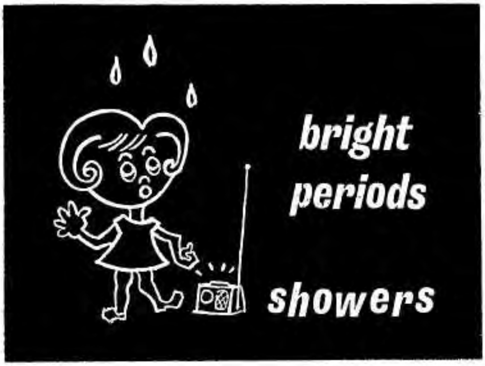
A typical completed caption.

One of the advantages of using a monochrome camera is that it is usually fairly easy to adjust the video gain and black level. To televise a grey scale, of course, the settings should be as 'normal'. If, however, the captions are black and white only, an improvement can be made by altering these two controls. By 'lifting' the black level, the pencil drafting lines, or the edges of the pieces pasted on will disappear. By increasing the gain, the whites can be made to 'crush' so that slight greyness in the characters does not show. Whilst both these effects are normally to be avoided, in this case the camera produces a pseudo-digital output. A simple level detector on the video output could produce the same effect if the camera is to be used for other purposes as well.

Having made simple captions of this type, the next step is to animate them. The techniques were pioneered by Alfred Wurmser for monochrome broadcast TV before the days of computer graphics. The idea is similar to the 'paste-on' method described earlier. The caption is built up in layers, with the fixed information on the front. A hole is cut in the front layer to enable the rear layer to be seen. The middle layer has a slightly larger hole cut in it. Inserted into this 'sandwich' is a sliding shutter, made of the black card again, retained in place by the front sheet. The sketches show the general arrangement. If the caption is viewed as before, with suitable adjustments of black level, the message on the rear layer will appear as the sliding shutter is removed. If suitable marks are put on the back of the shutter, then the 'reveal' can be done easily in stages. To make a slide that moves other than in a straight line is a little more difficult. A pivot is made using a brass paper fastener, covered with a scrap of black card so that it does not show. By planning the arrangement of the layers and shutters, quite complex reveals are possible. Remember, however, that there has to be part of each shutter accessible on the edge of the caption. It is a good idea to number them for multi-reveals.

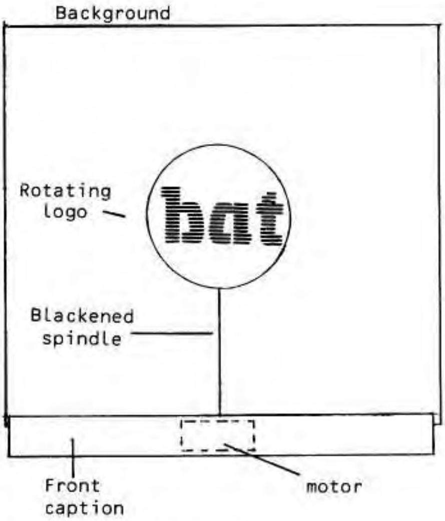


Caption components ready for pasting into place

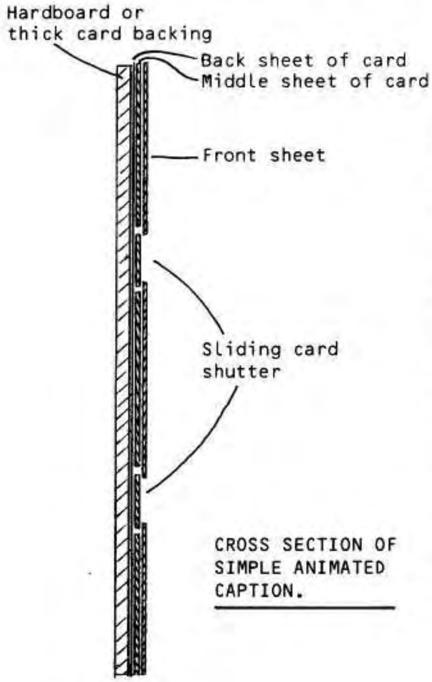


Finished caption

Another way to animate a caption is to place a moving display in front of the basic card. Mounting this onto a slowly turning motor provides a constant movement. (The geared motors found in analogue electric clocks or washing machine controllers are suitable). If all the visible parts of the spindle are painted matt black, they will be invisible on screen. A black cylinder or ball, containing a white legend, is fixed to the spindle. Provided that sufficient light is available, the camera lens iris can be partially closed, to keep the foreground and background in focus. It is even possible to add another part of the caption in front of the rotating symbol - sometimes a useful way to hide the motor. The early version of the BBC rotating-world symbol was created this way - with a curved mirror across the background.



'World' type moving caption.



CROSS SECTION OF SIMPLE ANIMATED CAPTION.

Moving captions can also be produced using a flexible black sheet, instead of card. The ends of the sheet are either fixed to two rollers or made into a loop held on rollers. As the rollers are turned, the caption moves across the screen. This is usually upwards, but can be made to go in other directions, provided the text is laid out suitably. A motor drive will make a more even movement than winding the rollers by hand.

Many amateurs, of course, now produce their signals in colour. It is quite easy to use a set-up based on these ideas to generate coloured captions. The captions are still produced in white on black, but the monochrome camera output is fed to the red green and blue inputs of a colour coder in differing proportions. A suitable circuit appears in CQ-TV117, and on page 88 of 'The Best of CQ-TV'. This enables the text and background to be created in any colour. If the idea is extended to slice at 2 levels, with appropriate logic, and the captions shaded with a mid-grey, then captions can be given a different coloured 'drop shadow' effect. The idea can be extended, of course, but for captions 3 levels is all that is normally needed, and is easy to work with reliably.

A number of other ideas for captions, using pictures cut from magazines and the like have appeared in CQ-TV before. ('The Artistic Side' in CQ-TVs 96 and 97, and 'Brighten Up Your Image' in CQ-TVs 125, 126 and 127.) Photocopies are available, for those who do not have the relevant back issues, from BATC Publications, who can also supply 'The Best of CQ-TV'. It is not claimed that these ideas are new, but they will hopefully encourage people to experiment. In the next, and final, part of this series, we will take a look at presentation.

INTERNATIONAL ATV CALLING
144.750 MHZ

SOUND IN THE STUDIO

by John Goode

When I wrote the original series of "In the Studio" articles, I had no intention of dealing with the sound side of the operation as I assumed that members of the British Amateur TELEVISION Club would not be interested in this. I am, however, persuaded by the Editor that this is not the case, and so I shall attempt to outline some of the standards and procedures used in studios, particularly where these differ from amateur audio practice. I shall try to avoid subjects such as microphone types and techniques, audio recording etc., as there are already many books and articles available on these subjects for those interested; rather, I shall try to concentrate on practices that may be new to those readers who have not worked in studios. For the benefit of younger readers, perhaps I should explain that the abbrieviation "GPO" stands for "General Post Office", part of which was responsible for inland telecommunications in the UK before it became British Telecom.

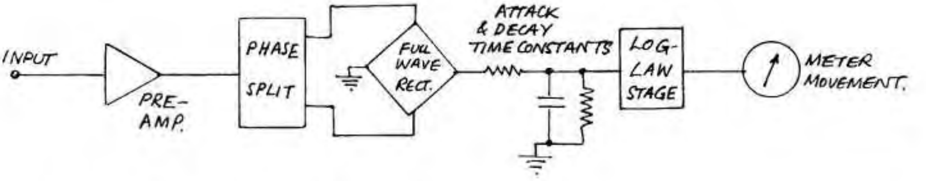


FIG. 1 PPM BLOCK DIAGRAM

STANDARD IMPEDANCE and LEVELS

The standard impedance in professional audio work is 600 ohms. The origin of this value is historical, it being the characteristic impedance (Zo) of the original GPO open wire telephony lines of the 1920s. This became transferred to audio work via the BBC, who in the early days had to use these lines to send sound to their transmitters, and it has remained ever since. The standard level is defined as 1mW, and in order to dissipate this in 600 ohms, a level of 0.775 volts is required. In Part One of this Series I explained the need for correct impedance matching, and how video distribution amplifiers require a gain of 2 to overcome the matching loss. The same arguments apply to high quality audio distribution, except of course that the impedance involved is 600 rather than 75 ohms.

In studios audio levels are always referred to in decibel notation, and so the standard level is therefore said to be 0dBm (spoken of as "zero level", or "zero dB"). The significance of the "m" after "dB" is that the reference level for the dB is 1mW. It should be noted that 0dBm is the standard audio line-up level; unlike amateur practice, this is NOT the same as peak level, which is +8dBm. Again, the origin of this is historic, as sending 1kHz line-up tone at peak-level down landlines could cause interference to other lines in the same cable, and so a lower level was adopted.

DECIBEL NOTATION

As many of you will know, the decibel system is one of RATIO rather than absolute values, and therefore any decibel figure that is given is meaningless unless a reference for that figure is known. In professional audio the reference is 1mW, and in the rest of this article I am going to take that as read - so that if I refer to -20dB, I mean -20dBm, or -20 dB w.r.t. 1mW. I know that the decibel was explained in the last issue, however, before moving on I think a few words about it as it applies to sound will help - I hope!

The decibel is particularly appropriate for measuring sound ratios as it is a logarithmic unit, and the human ear responds to sound intensity changes in a logarithmic manner. The decibel value of electrical changes can be calculated by using one of two formulae as is appropriate:-

dB = 10 x (log of the ratio of two POWERS)................(1)

or, dB = 20 x (log of the ratio of two VOLTAGES)..............(2)

The fact that there ARE two ways of calculating decibels is a source of confusion for some people - indeed, you can sometimes overhear people who should know better saying things like "Now are these voltage or power decibels?" as if there are two types of dB! There aren't; but there are two ways of calculating them.

As an example that may help to clarify this problem, consider a 1kohm resistor that has a 1 volt signal across it. By Ohm's Law it will have 1mA of current flowing through it, and since power is given by V x I, it will be dissipating 1mW. Let us now double the voltage across the resistor to 2 volts. The value of the resistor will not change, and so the current must double to 2 mA. Now, when the power is calculated, we get 2volts x 2mA = 4mW. Let's now translate this into dB.

The voltage was doubled, so the voltage ratio is 2.

from equation (2), dB = 20 x (log 2)
= 20 x 0.3010

= 6dB approx.

However, the power went from 1mW to 4mW, a power ratio of 4.

from equation (1), dB = 10 x (log 4)
= 10 x 0.6021

= 6dB approx.

So we have two methods of arriving at the same result. One point that arises from this is that strictly speaking, when using the voltage method to calculate dB, two voltages should only be compared if they are develped across resistances or impedances of the same value. If this is not done the calculation will not agree with the corresponding power calculation, and the value given by the voltage ratios will be wrong.

To return to more practical considerations, here are some examples of levels (expressed in dBm) that may be encountered in professional sound:-

Microphone level....-70 to -60dB (depending on type of mic).

Mixing level........-20dB (typical mixing desk).

Distribution level...0dB

Peak programme .....+8dB

Minimum"headroom"...+14dB (onset of distortion).

Finally, there is the advantage with dB notation that being logarithmic, gains and losses in the programme chain can be added and subtracted instead of multiplied and divided.

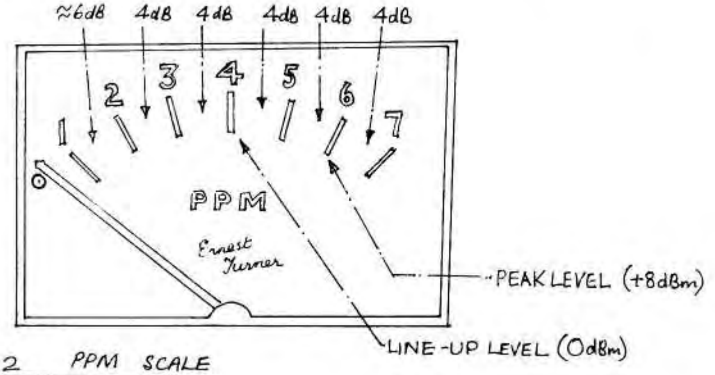


FIG 2 PPM SCALE

THE PEAK-PROGRAMME METER (PPM)

The preferred instrument for measuring and monitoring audio levels is the peak-programme meter. Its performance, both electrical and ballistic, is specified by the B.S.I. so that it may be regarded as an industry standard. In essence the PPM is a specialised amplified AC voltmeter, with a logarithmic law-conversion stage allowng the display to indicate decibels in a linear manner. The block diagram is shown in fig 1, and fig.2 illustrates the standard meter face, which, in its standard form, is black with white markings. The divisions from 2 to 7 are arranged to represent changes in volume of 4dB; from 1 to 2 is approx. 6dB.

Line-up level, nominally 0dBm, is represented by 4; peak level, +8dBm, is therefore 6. Between 1 and 7 a range of about 22dB is therefore displayed, and this represents the range over which the majority of types of programme will need to be controlled. In order to make the meter easy to read, the attack time of the peak reading circuit is made rapid (about 2mS), and the decay time slow (about 3 secs). This, combined with the known ballistics of the meter movement, gives a known performance on all PPMs that experienced sound engineers are used to.

The PPM was originally developed by the BBC as a means of indicating peak programme level, and, considering the technology of the time, it may be considered very successful. However, any system involving a mechanical meter cannot respond fully to every peak due to the inertia of the meter movement. Nowadays this can be eliminated by employing LED or LCD bar-graph displays in place of the mechanical meter. However, many engineers who have "grown up" with the "traditional" PPM, (including the writer), still prefer it, although this may simply be due to familiarity.

Another similar device that may be encountered in studios is the VU (Volume-Unit) meter, the US method of checking audio level. This is not a peak measuring device; it gives an indication of average volume, and is only really accurate on line-up tone. There is no amplification or law-conversion with this device, it being connected via a load resistor directly across the signal to be measured. A true VU meter will have ballistics and a load resistor according to the proper Bell Labs. specification; the majority of meters on sale that have a VU scale are not. Most UK professional users would specify PPMs rather than VU meters as this is the broadcast standard here. Currently, some apparatus that is fitted with bar-graph metering offers the facility of switchable PPM or VU characteristics.

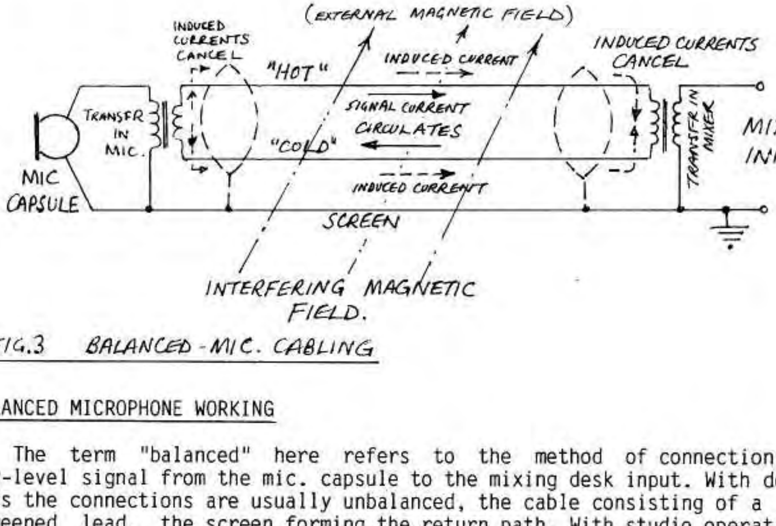
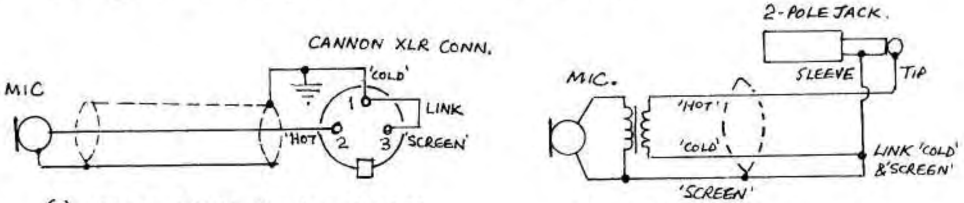


FIG.3 BALANCED-MIC. CABLING

BALANCED MICROPHONE WORKING

The term "balanced" here refers to the method of connection of the low-level signal from the mic. capsule to the mixing desk input. With domestic mics the connections are usually unbalanced, the cable consisting of a single screened lead, the screen forming the return path. With studio operation, it is normal for the circuit to include balancing transformers at both the mic and mixer ends. See fig.3.

The mic cable consists of "hot" and "cold" signal conductors that are accurately matched in resistance, surrounded by an earthed screen. The microphone signal consists of circulating currents in the balanced cable, whereas any induced currents caused by external magnetic fields will cause equal parallel currents to flow in the same direction in both legs. These parallel interfering currents will cancel in the balancing transformers, as they will try to flow through the windings in opposite directions. In this way the low-level mic signal is protected from magnetic interference, which can be quite severe in TV studios. Note that it is possible to wire balanced mics so that they can be connected to unbalanced inputs (and vice versa), although the advantages of balancing are lost, of course. See fig 4.



(a) UNBAL. MIC TO BAL. MIXER INPUT.

(b) BAL. MIC TO UNBAL. INPUT.

FIG. 4 - BALANCED TO UNBALANCED & VICE-VERSA

PHANTOM POWERING

Capacitor mic's are widely used in studios, and they have a small head amplifier built into the mic body. In order to power this from the mixing desk, advantage is taken of the DC isolation and the interference cancellation of the balancing technique to allow "phantom powering". See fig. 5.

The DC for the head amp. is applied to a centre tap on the mic side of the mixer transformer, causing a parallel cuurent to flow in the balanced-pair. This can be picked off with a centre-tap on the mixer side of the mic output transformer, and fed to the head amp. Thus we have an invisible, or "phantom" circuit derived from the mic cable for powering the mic. This is a simplified version of the original GPO phantom technique, where an additional balanced signal circuit could be be derived from two other balanced landlines, using centre-taps on the balancing transformers. Note that plugging an unbalanced mic into a mixer wired for phantom power is not permissible, as the DC supply will be shorted if "cold" and "screen" are connected together (fig 4).

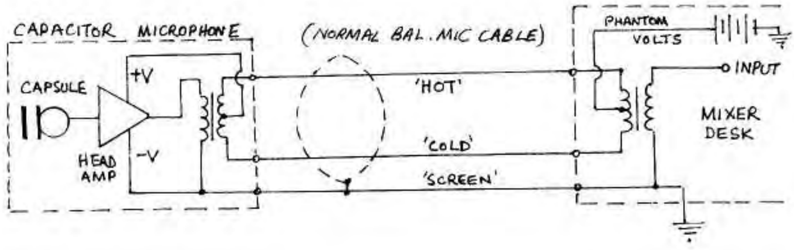


FIG 5: - PHANTOM POWERING

SIGNAL PATCHING

In TV studios signal routing will normally be accomplished by means of electronic switching matrices, a video switcher and an audio switcher being under the common control of a remote routing selector; this will give the "audio follow video" mode. However, there will be situations when more flexible audio routing is required, and of course some occasions when faulty apparatus must be substituted by spare units. In these circumstances patching by means of plugs and jacks is usual. There is a standard form of apparatus bay wiring that the BBC employed that uses switched jacking to allow (say) amplifier substitution with no break in transmission. This is the "Listen, Apparatus & Line" method which is illustrated in fig.6. In order to substitute a spare amplifier a patch cord is plugged into the normal amplifier's "listen in" jack and connected to the "listen in" of the spare amplifier; this feeds the same programme through both amplifiers. A second patch cord is then connected to the spare amp. output, and the action of inserting the free end of this cord into the 'line out' jack (X) instantaneously disconnects the original amplifier from its tied destination, and substitutes the spare. To completely isolate the original amplifier, a third patch cord is now connected from the spare amp. "app in" to the "line in" of the original. The cord connecting the "listen in" jacks can now be removed, and the original amp. can be physically removed from the apparatus bay for repair.

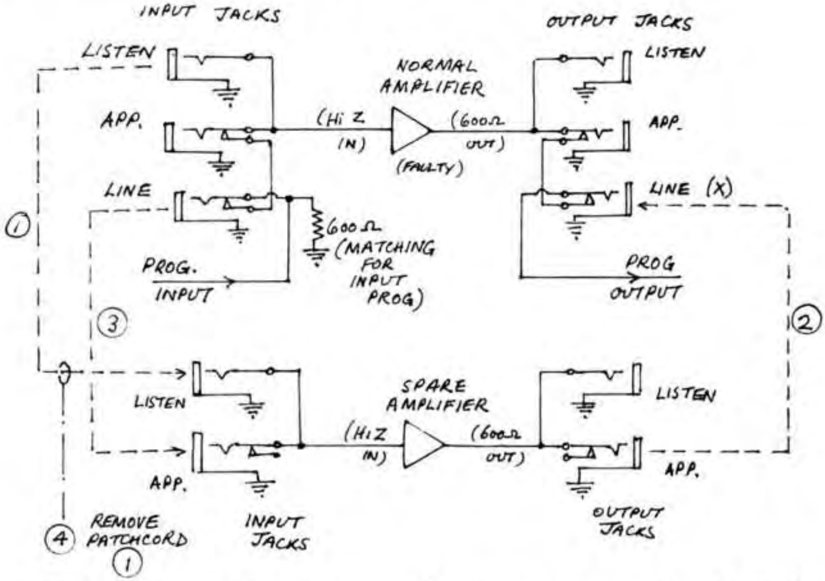


FIG 6:— APPARATUS WIRING (SUBSTITUTING FOR A FAULTY AMP)

For clarity in Fig 6 I have shown 2-pole jacking, whereas in many large professional installations the wiring will be balanced to prevent crosstalk, particularly as all inter-bay wiring will probably be via an underfloor distribution frame. The standard patching connector adopted is the BT316 type plug and socket which has 3 poles - see fig 7.

So far I have just scratched the surface of this subject. If there is real interest, I will extend it into the more practical area of circuits for mic amps, mixers, etc. Rightly or wrongly, I had always assumed that the BATC was exclusively concerned with the vision side of TV. If that is not the case, please let the Editor know.

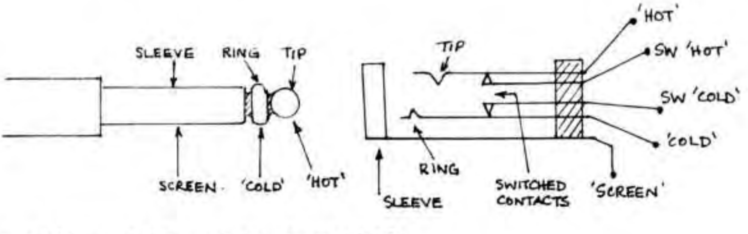


FIG 7 :— BT 316 JACK CONNECTORS

COMPONENTS GALORE!

If you are into construction then the new BONEX catalogue is for you. At 80 pages this large format volume is absolutely packed with all the most useful components and accessories for the radio and TV amateur. For us TV'ers there are all those popular devices and components used in CQ-TV projects, including many of the harder to get ones as well. Bonex Ltd is a member of BATC and keeps a strict eye on our projects. Often, if certain components are not already held, they will put stocks in just for us.

This catalogue is their first, nevertheless it is very well laid out and easy to read. Many products are illustrated and prices are on each page. Of course, being a first issue, there are a few minor errors. You will find the odd spelling mistake or an occasional duplicated number, but these are things which can be caught next time round. One bloomer however is that VAT details have been omitted, VAT should be added to all prices.

An excellent index reveals a veritable plethora of goodies such as: batteries, A/V leads, passive components, trimmers, plugs and sockets of all kinds, much of the TOKO range including all those awkward coils, transformers, filters, chokes etc. Then there are boxes, heatsinks, hardware, RF toroids and ferrite components, relays, opto devices, lots of linear and digital chips and some very useful transistors (for BATC projects etc) including some of the more fancy RF power transistors and receive GaAsFETS. Diodes in plenty including varactors for FM-TV, test equipment, switches, PCB hardware and drafting aids, drills, burrs, soldering equipment and handtools. Transformers, PC board, Vero, Eurocards; all are stocked and, just for good measure, there are quite a number of useful kits and modules including those from C.M.Howes Communications. Of considerable interest to us are a quite comprehensive range of products from LMW Electronics, these include such things as a microwave local oscillator chain, 23 and 13cm GaAsFET pre-amplifiers, 23 and 13cm transmit mixer/amplifiers, 23 and 13cm complete systems, 23 and 13cm power amplifiers, weather satellite receiver, plus various other converters, oscillators and pre-amplifiers.

With all that lot, backed by a well known, personal and respected service, I consider this catalogue to be essential reading for the keen amateur. Send £1 to BONEX LTD., 102 Churchfield Road, Acton, London W3 6DH. Tel: 01-992-7748. Access and Visa credit cards accepted.

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70CM PRE-AMPLIFIERS

By J.Gannaway G3YGF and C.Suckling G3WDG

This article first appeared in RADCOM in December 1980 and we thank the editor for his permission to reproduce it here. Although 7 years old this design and the techniques involved are still relevant today.

INTRODUCTION

This article describes the construction of a preamplifier for 70cm, with a noise figure of around 0.5dB, using a Gallium Arsenide Field Effect Transistor (GaAsFET). Also included is a design for a second-stage preamplifier with a noise figure of around 2dB, using a BFR34A transistor. These preamplifiers are in current use by several ATV stations with great success. The main emphasis is on achieving very low noise figures, but the devices are also capable of very good strong signal performance, with a consequent reduction in noise figure.

The one major problem when using GaAsFETs is that they have a very high input impedance. Bipolar transistors have input impedances which are relatively close to 50-ohms, typically a few hundred ohms, so they are quite easy to match in either narrow or broadband systems. This leaves open the option of fitting narrow, low-loss filters in front of preamplifiers using them. However, with GaAsFETs the input impedance is in the order of tens of kilohms, so a very high-Q network is necessary to step up the impedance with low loss, and it is consequently difficult to make them operate over a broad bandwidth. This is a disadvantage for many professional applications, but actually a

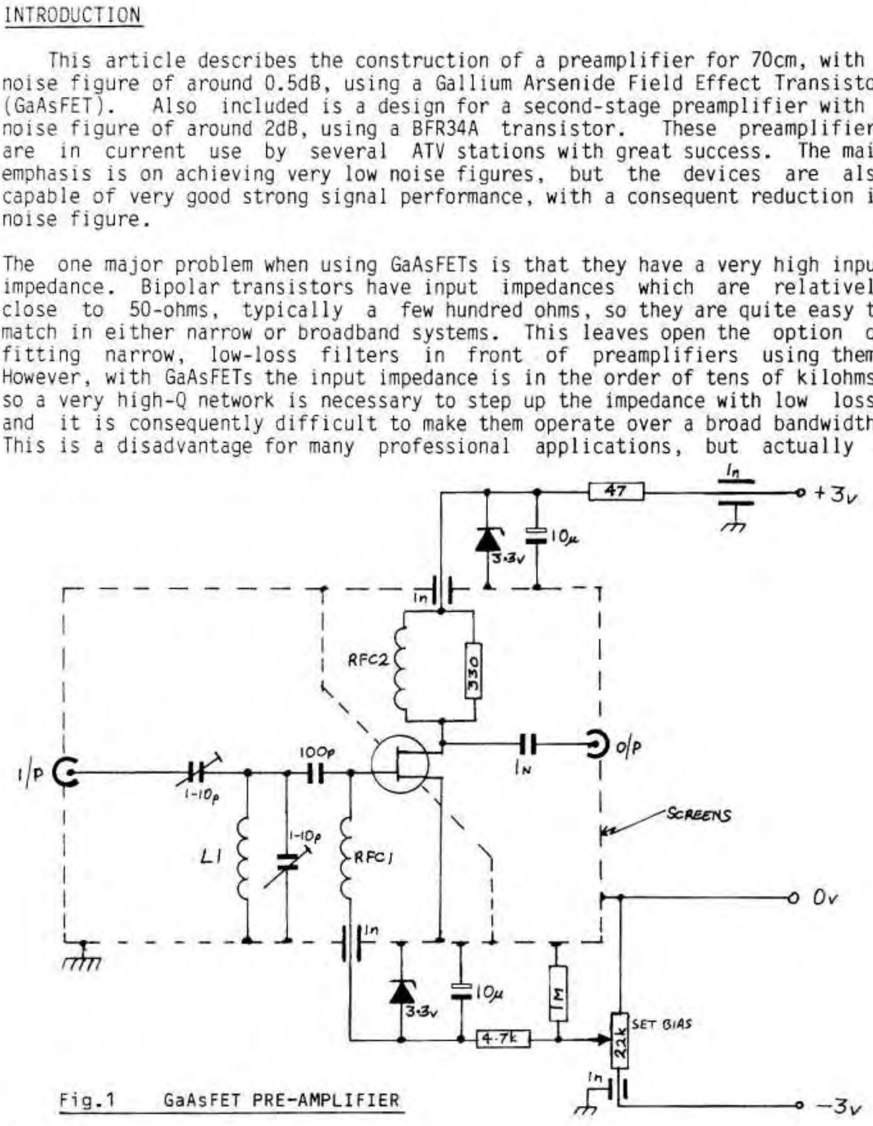


Fig.1 GaAsFET PRE-AMPLIFIER

positive benefit for amateur applications. It requires the construction of a very narrow bandwidth, low-loss input matching circuit, which will reject out-of-band signals and reduce the number of spurious products generated in the receiver. This is particularly effective since the filter is in front of all the active devices in the receiver. Broadband preamplifiers can suffer badly in this respect from the large number of strong signals present in the VHF and UHF bands. This preamplifier has been used in close proximity to quite powerful 2 metre transmitters with aerials on the same mast without experiencing problems.

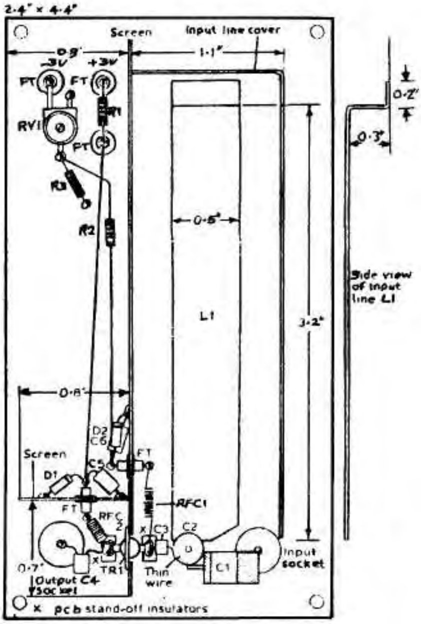


Fig.2 GaAsFET pre-amplifier layout.

CONSTRUCTION

The circuit of the GaAsFET amplifier is shown in Fig.1, and the layout shown in Fig.2. It is built on double sided printed circuit board, which is used as a ground plane. The whole amplifier fits inside a 4.4 x 2.4 x 1.25 inch diecast box, with the ground plane replacing the lid. The screens are also made from double sided pcb for rigidity and ease of soldering. The covers for the input inductor L1 are made from thin brass or copper foil.

Firstly mark and cut out the PCB to fit over the top of the diecast box and drill the mounting holes in each corner. Mark the position of the posts in the corners of the box on the pcb, so as to avoid mounting anything on the board which will foul them; this is likely to occur if the input socket is too near the corner of the box. Solder the three pieces of pcb screen (0.8in high) in place, soldering both sides of the screens along all of their length. Mount the feedthrough capacitors in the screen and lid. The capacitor entering the GaAsFET's drain compartment should be about halfway up the screen, and the one into the gate line about 0.2in from the top of the screen. Cut out two small pieces of pcb about 0.125in square as mounting pads for the FET leads and glue them down flat to the ground plane on each side of the gap in the screen. Mount the input and output sockets and C2, making sure that the sockets do not foul the sides of the box. If sockets requiring four mounting holes are used they can be pushed through the PCB from the inside of the box and soldered to the ground plane on the inside. Single hole fixing sockets can be used in this way or just bolted in. BNC, TNC or SMA sockets are suitable due to their size, whereas N-type sockets would be too large.

Adjust the distance by which the input socket protudes above the PCB so that C1 can be easily soldered to both C2 and the socket. Next, form the input inductor L1 from some copper sheet about 0.040in thick. Solder the inductor in place, grounded end first and then the end resting on C2. All the other components can then be installed. Take care when soldering to the trimmers as the top connections can become unsoldered from the body if they get too hot. A piece of flexible wire, rather than copper strip, should be used to connect C2 to C3 to prevent any stress being applied to C3. Next, bend up the screen to cover the top, side and end of L1 and solder it in place along all the joints. The screen should stop just at the end of L1, leaving access to both trimmers and the FET, and be about 0.3in above the copper line forming L1.

The next step is to install the GaAsFET. This requires sensible precautions when handling the device to avoid damage due to transient static voltages. A few simple precautions to follow are:

1) Do not handle the device in a room where one can draw sparks from objects after walking across the floor.
2) Touch earthed objects frequently. Alternatively a static conducting wristband could be worn suitably earthed.
3) Touch the source first when picking up the device.
4) When installing the device in the amplifier hold the amplifier chassis at the same time, thus keeping them both at the same potential.
5) When soldering the GaAsFET into the circuit, unplug the iron from the mains and ensure that the iron is earthed to the pcb during soldering.

There are two types of package for the GaAsFET that may be encountered: the threaded stud type and the cross type of package. If using a device in a threaded stud housing, drill a 1.2mm diameter hole in the pcb between the two stand-off pads. The lead with a 45 degree cut across the end is the gate of the device, the stud is the source and the other lead is the drain. Bolt the device into place and tighten up the nut before soldering the leads, in order not to tear them off due to the device rotating. The leads may then be soldered to the stand-off pads.

For GaAsFET's housed in the cross type of package, solder the two source leads (again the gate is the lead with the diagonal cut, the drain being diametrically opposite), to the screens on either side of the stand-off pads. The gap between the two screens can now be closed by soldering some thin metal foil across it. Another metal foil screen can now be soldered over the end and top of the input circuit, leaving access to adjust C1.

The trimmers C1 and C2 need to be low loss types and Johanson or JFD types are recommended. Miniature PTFE dialectric gold-plated trimmers similar to those supplied by Vero have also been used successfully, as have Sky trimmers (Piper Communications) and Hewlett Packard types. C3 is ideally a chip capacitor, but an ordinary disc ceramic may be suitable. RFC1 is constructed from 15 turns of 26swg enamelled copper wire, self supporting with an internal diameter of 0.125 inches. RFC2 is 10 turns of 26swg wire wound onto the body of R4.

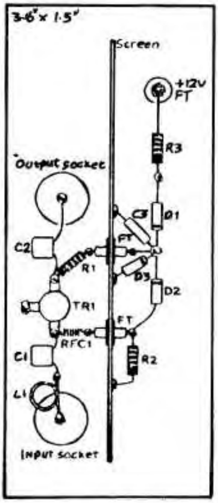


Fig.4 BFR34 pre-amp layout.

BIPOLAR AMPLIFIER

The BFR34A preamplifier (Fig.3) is built in a similar manner in a smaller diecast box. Construction is very simple and the layout is shown in Fig.4. The base and collector of the transistor is soldered to stand-off pads and the emitter soldered to the PCB. The input and output sockets are located such that only the shortest leads are required on the interconnecting components. A PCB screen is soldered along the whole length of the centre of the board, with the two feedthrough capacitors mounted as shown. All the power feed components are mounted onto stand-off pads on the other side of the screen, with power being fed into the box via another feedthrough capacitor.

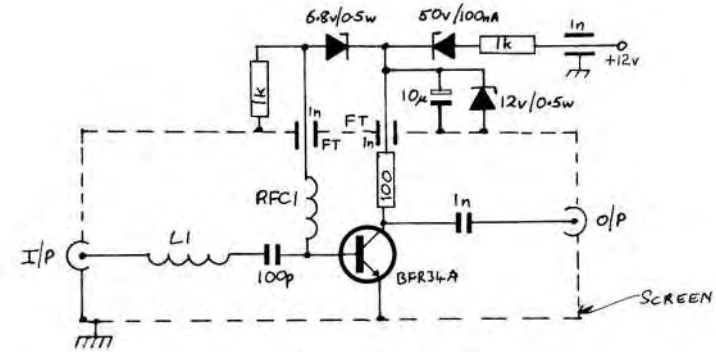


Fig.3 BIPOLAR PRE-AMPLIFIER

POWER SUPPLIES

GaAsFET's are very sensitive to transient voltages because of the very small capacitances and physical dimensions of the chip. The width of the gate is about 1 micron, so even relatively low voltages can produce very high fields in the chip. The manufacturers maximum ratings are typically as follows:

Vgs	6 to 0v
Vds	0 to 6v
Vdg	0 to 10v
Pmax	500mW
Max forward gate current	2mA
Max reverse biassed gate leakage current	10uA

The gate is the electrode most susceptible to damage by transients, but once it is installed in the circuit it is fairly robust. By far the safest and very strongly recommended method of powering the preamplifier is from batteries. Holders for four HP7's can conveniently provide +/- 3v if a connection is made to the centre tap of the batteries. These would be mounted near to the preamp, as excessively long leads may increase the chance of picking up transients from other equipment, such as relays. However several of these units have been built and powered from simple mains power supplies without any problems being encountered. The over-voltage zener protection provided in the preamp circuit takes care of power supply fluctuations, however, care must be taken as these diodes are not fast acting enough to protect against power surges caused by lightning etc.

TESTING

Set the bias pre-set to half way and then connect the supplies. For optimum safety apply first the gate and then the drain supplies, as this avoids the device drawing too high a current should the gate supply be applied later than the drain. The reverse procedure should be observed when switching off. The drain current should initially be set to 10mA, and can be monitored by measuring the voltage across R1 being approximately 0.5v. If the preamplifier is operated without a 50-ohm load on the input spurious oscillations may be generated. If suitable test equipment for optimising noise is not available, connect the two preamps together and put them into the receive line. Adjust C1 for maximum received signal and C2 for minimum noise on the screen. Do not be misled into tuning C2 for maximum signal strength, as this invariably will not be achieved at the setting for the best noise figure, and a consequent degradation of the system will result. Once optimised the preamps should yield a total gain in the order of 25 to 30dB, with resultant picture strengths being improved by at least one P-point.

CONCLUSIONS

The GaAsFET preamp should ideally be mounted as close to the aerial as possible, as any feeder losses will add to the overall noise figure. If the losses in the feeder are likely to exceed 1dB, then the second stage preamp should also be mounted at the masthead.

Various GaAsFET's have been tried in the circuit, including the Plessey GAT4, GAT5 and GAT6, the NEC NE12683 and the Alpha 1000, all of them giving very similar performance. Although these devices have inherent noise figures much lower than 0.5dB, the noise figure of the circuit remains at best at that figure. The extra noise comes from the losses in the input circuit, and it is here that there may be scope for experimentation and improvement. Other well known devices that have not been tried but may well be suitable are the Mitsubishi MGF1400 series and the NEC V244 and V388.

1987 NBTV CONVENTION

The 1987 NBTVA Convention took place at Loughborough University (Dep't of Electronic & Electrical Engineering) on Saturday 25th April. Previous annual meetings have all been held (since 1975) at the Trent Polytechnic, Clifton.

The exhibition this year was of a high technical order with seven working cameras on display. Notable were the demonstration of red/green colour TV by Deryck Aldridge using LEDs, and of NBTV via down-conversion from 625 line broadcasts. These were displayed in parallel, in standard 32-line form on an oscilloscope, and re-projected onto a 625-line TV raster via a UHF modulator. Picture quality was magnificent, even when played back from a standard (audio) tape-recorder. The converter was designed and built by Don McLean.

In many ways the best Convention to date.

FM-TV CHAT

By John Wood G3YQC

Some more bits of information for those interested in FM-TV have come my way which I should like to pass on.

THE FM DEMODULATOR

I think there is little doubt that for amateur use, the NE564 PLL demodulator takes some beating. However, according to Josef Grimm, DJ6PI [1], it does have its disadvantages:

Since the maximum specified working frequency is 50MHz, those using higher IF's (eg. 70MHz), often find that the circuit becomes unstable. Also it is not uncommon to find a defective chip, even if it has been in use for some time. It is difficult to be specific about the symptoms but some I have come across include; poor sensitivity, an intolerance of higher deviations and an inability to lock correctly, necessitating constant re-tuning etc.

It is possible now to put a figure on the bandwidth of the device when receiving a broadband FM-TV picture. That figure is 22MHz which, although a bit narrow for satellite users, is just about ideal for amateur work. Trying to receive a too widely deviated signal will show ragged edges to picture verticals, particularly against white objects. The way the chip is used though can have an effect on the amount of deviation it can handle and the circuit shown in Fig.1 is about the best I have come across. Many of you will notice that the same circuit is used by Wood & Douglas in their VIDIF.

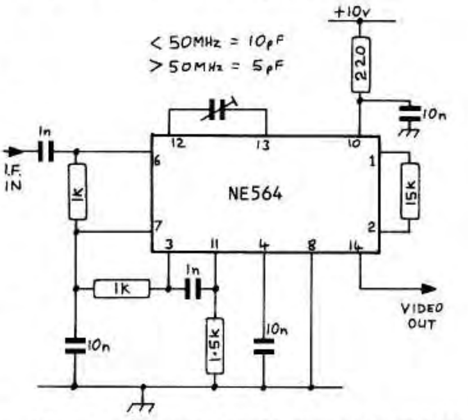


Fig.1 Typical NE564 PLL DEMODULATOR

The internal vision signal-to-noise ratio is unfortunately only around 40dB, which is why - even when receiving the strongest of signals - there is often a slight trace of noise on the screen. Commercial TV reproduction demands a signal-to-noise ratio of around 60dB.

One other point: although the NE564 has an internal limiter it can still be quite easily overloaded, therefore it is a good idea to precede the chip with a separate limiter amplifier such as the MC10116.

PRE-EMPHASIS

From talking to many operators over the air it seems to me that many either ignore the use of pre-emphasis altogether or experiment with it incorrectly, often concluding that it is not worthwhile. Let's have another look at this subject:

To quote from ref.1 "The demodulation of an FM signal reveals an inherent undesirable effect; a linear increase in the noise signal as the modulation frequency increases (see Fig.2). This is known as the 'FM triangular noise', the AM spectrum on the other hand is flat."

Since the amplitudes of the higher frequency video signals from a video camera tend to be lower, the result of this FM triangular noise is a noisy picture.'

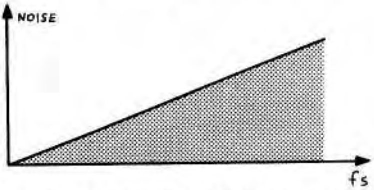


Fig.2 FM TRIANGULAR NOISE SPECTRUM

The solution is to use pre-emphasis which, as its name suggests, emphasises the higher modulating frequencies linearly with frequency, thus compensating for the triangular noise and equalising the signal-to-noise ratio across the band. Of course, in order for such a system to work, a complementary de-emphasis network at the receiver must be used to attenuate the higher modulating frequencies and restore the relative amplitudes to those of the original video signal.

If you want to try the effect out over the air you must first ensure that both pre-emphasis and de-emphasis networks have complementary specifications. The 'standard' used is CCIR 505/1 [3] and practical circuits are illustrated in Fig's 3 and 4.

TRY IT FOR YOURSELF

There is little use in receiving a picture which has pre-emphasis, and by simply switching in a de-emphasis network expect a magical improvement. You should in fact notice a DETERIORATION in the picture! Let's find out why:

If you consider the circuit of a pre-emphasis network you will see that it is totally passive. Therefore, in order to effectively emphasise the high frequencies, it actually ATTENUATES the LOW frequencies. The situation you then find yourself in is one of low deviation, since your previously set deviation level will now only be reached by the highest video frequencies. The answer of course is to TURN YOUR DEVIATION UP. The receiving station, assuming he has the correct de-emphasis network switched in, should see a noticeable reduction in the noise on your picture.

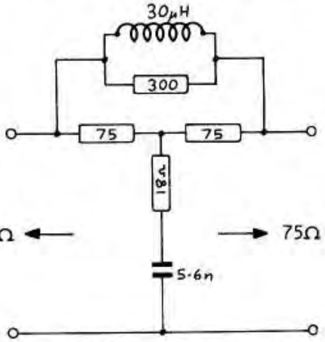


Fig.3 625-line de-emphasis network (receive)

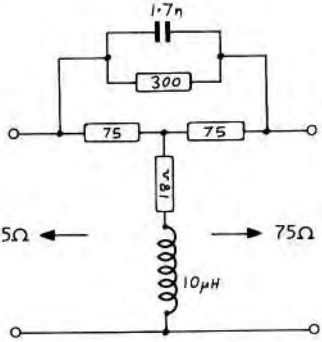


Fig.4 625-line pre-emphasis network (transmit)

AN 'HF LIFT' EXPERIMENT

I have long gone on about the need for wideband amplifiers in an FM-TV system so that the picture is not effected by amplitude falloff at the signal edges (bandwidth restriction). Many video circuits used by amateurs in both transmitters and receivers suffer from HF falloff which means that high frequency components of a picture (including the colour and sound sub-carriers) are often severely attenuated. This effect usually manifests itself in poor colour locking and noisy sound at the receiver. I have done some experiments based on an idea by John Goode (ref.2) which go some way towards overcoming the problem.

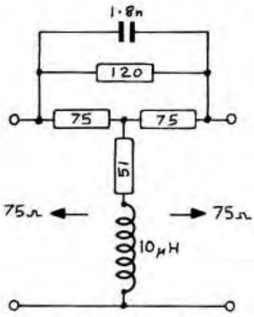


Fig.5 Circuit to give +6dB HF lift.

Basically the idea is to boost the HF frequencies at the transmitter (much like pre-emphasis) in order to compensate for the high frequency rolloff. The difference against pre-emphasis though is that, since you are simply attempting to compensate (pre-distort) your signal to overcome deficiencies in the transmitter, there is no need for the receive station to use a similar network. The network I use allows a +6dB lift at 5MHz. (see Fig.5.

Of course it is also possible to partially compensate in a receiver, although if the information is not being transmitted then it will be difficult to recover! The reason for using a similar system though in a receiver is to overcome any possible deficiencies in the video amplifiers following a demodulator. Since the network is passive and has 75-ohm input/output impedances, it is quite easy to make it up and simply connect in series with the video line. Just as in a pre-emphasis network the circuits work by cutting the LF signals rather than actually amplifying the HF response, so don't forget that the deviation at the transmitter must be turned up accordingly to restore peak deviation, whilst in the case of compensation in a receiver, the video gain must be increased to restore the video level. Both transmit and receive networks are the same (Fig.5).

A PROPOSED 2.3GHz BANDPLAN

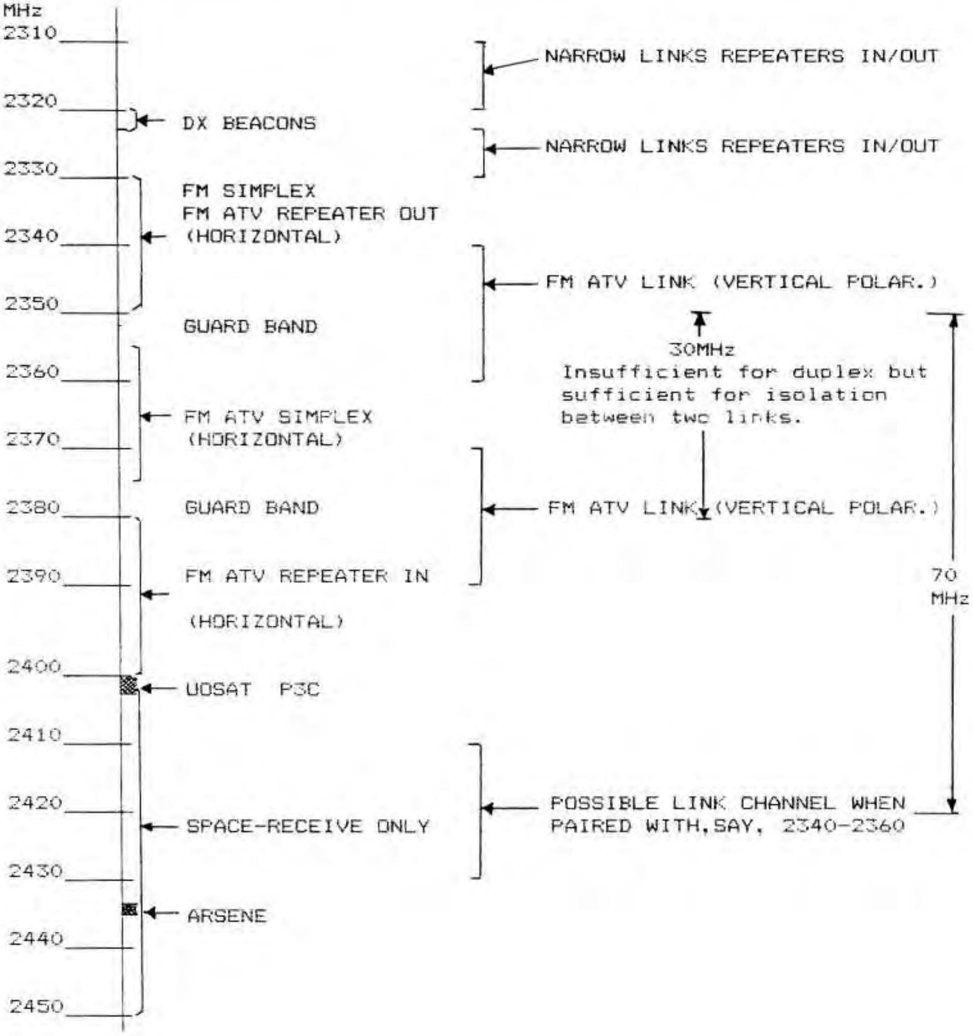
This year an attempt is being made by the RSGB Microwave Committee to produce bandplans covering the various amateur microwave allocations. A proposed plan for the 10GHz band was printed in CQ-TV 137 and now there is a similar proposal for the 2.3GHz (13cm) band.

As you can see the needs of amateur TV have been catered for with no less than three, 20MHz wide channels available for FM-TV. The 2.3GHz band is considered to be well suited to repeater linking and the plan therefore makes provision for both narrow and wideband links.

The word "possible" against the channel which also incorporates space - receive only is put that way because it is known to clash with the internationally allocated amateur space sub-band: there has already been reaction from AMSAT on that, even though it is not, as far as is known, in use - or even planned for use! Nevertheless the future use of space communications must be carefully considered along with current and future terrestrial requirements.

The bandplan shown here is one recently discussed at the RSGB Microwave Committee in the light of the possibility of using the band for repeater links in the future. In order to establish a coherent policy, the Committee needs input from interested parties such as BATC, RMG, AMSAT and individuals.

A POSSIBLE 2.3GHz BANDPLAN INCORPORATING REPEATER LINKS


MHz
2310
2320
2330
2340
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
2450
DX BEACONS
FM SIMPLEX
FM ATV REPEATER OUT
(HORIZONTAL)
GUARD BAND
FM ATV SIMPLEX
(HORIZONTAL)
GUARD BAND
FM ATV REPEATER IN
(HORIZONTAL)
UOSAT P3C
SPACE-RECEIVE ONLY
ARSENE
NARROW LINKS REPEATERS IN/OUT
NARROW LINKS REPEATERS IN/OUT
FM ATV LINK (VERTICAL POLAR.)
30MHz
Insufficient for duplex but sufficient for isolation between two links.
FM ATV LINK (VERTICAL POLAR.)
70 MHz
POSSIBLE LINK CHANNEL WHEN PAIRED WITH, SAY, 2340-2360

Your opinions, ideas and mod's to the SUGGESTED plan shown here are earnestly sought and should be addressed to the Chairman of the Microwave Committee, G3PFR, QTHR or c/o RSGB HQ or, in the case of ATV matters, to Graham Shirville, G3VZV, The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF.

This plan is published in the May issue of the RSGB Microwave Newsletter and acknowledgement is made to the committee for allowing its reproduction here.

References:-

[1] Frequency Modulated Amateur Television (ATV) by Josef Grimm, DJ6PI, VHF Communications 3/86.
[2] A Custom-Designed FM-TV video strip by John Good and John Wood, G3YQC, CQ-TV 132.
[3] Pre-emphasis characteristics for frequency modulation radio-relay systems for television. Recommendation 405-1, The CCIR.

ALUMINIUM BOOMS, STAINLESS STEEL ELEMENTS.

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ABERDARE, MID-GLAMORGAN, WALES.

Tel: PORTH 685515
ABERDARE 870425

70cm AERIALS	P&P	GAIN dBd	BOOM LENGTH	READY MADE	DIY PARTS
Fibreglass colinear	£2:00	5.0	5'0"	£25:00	-
12 element Yagi	£3:00	14.0	6'0"	£12:00	-
17element Yagi	£4:00	15.0	8'0"	£18:00	£14:00
24element Yagi	£4:00	17.0	10'0"	£25:00	£19:00
Double Delta	£4:00	16.0	4'6"	£35:00	-
8 turn helical	£4:00	13.0dBi	5'0"	£35:00	-
12 element crossed Yagi	£4:00	14.0	6'0"	£22:00	-
23/24cm AERIALS					
20 turn Helical	£4:00	17.0dBi	4'0"	£33:00	-
PARADELTA	£5:00	18.0	3'x2'x12"	£40:00	-
6'6" PARABOLIC DISH (mesh)	£9:00	25.5dBi	6'6"	£95:00	-
18 element Parabeam	£4:00	15.0	5'0"	£45:00	-

Lots of others: 2-Metres, 4-Metres, 6-Metres, P.M.R., Weather satellite etc.
Any frequency to order.
FIBREGLASS BOOMS, TUBES RODS:
3/8" tube: £1. per Metre, 1/2" rod: £2., 3/4" tube: £2:50., 1-1/2" tube: £5., 1-3/4" tube: £6.
Aluminium tubes, spares, element holders etc.

SEND S.A.E. FOR LISTS.

TV ON THE AIR

By Andy Emmerson G8PTH

SLOW-SCAN ACTIVITY

It's funny how no news comes in for months, then suddenly several letters arrive. As Richard G3WW says, people like reading about their activities but are too busy to write about themselves. Anyway, no problem this time, because several folk have taken time out to drop me a line.

From Uxbridge, Middlesex, Jim G2BMI writes "Who says SSTV is dead? It's only hibernating!

"This shy, soporific, timorous vertebrate does surface occasionally to be hunted. One such animal, the "inva" came out of its hideaway, and the open season was from the 16th to the 20th March. I did not manage to locate the country of origin, but it appeared that the whole of Europe was calling 'CQ Inva Contest'. I managed to hook HA9SB, YU1NR, LZ1WN, IS0XRI, OK3CKW, HA5JI, HA1ZH, LZ1OW, YU1CS and YU1AA, but the others got away. They were 5B4CU, 9K2DZ, VU2DK, EA8AEU, SM5EEP, LZ1VF, IS0ATZ, N4MZL, FD1JMC, G4XIS, JA1HHL, EA8EV, W4SCJ, WA2FDL and EA3FTR.

"Being an 'OT' I only found out about the contest while browsing around on 14230, and I hope our next contest has as many entrants. Incidentally HA1ZH had a total of 51 SSTV contacts when I contacted him."

Paul G4TBQ lives in Burton-on-Trent and says "I have been active on SSTV for the past six months using a DRAE converter and JVC camera. More recently I have had a 48K Spectrum computer and the excellent G1FTU program for the text. Activity on 20 metres is very good and now that 10 metres is more lively, a good idea is to make contacts on 20 and then QSY to 10 where excellent QRM-free pictures can be exchanged. The next band is six metres and I wonder if there are any SSTVers active there. My best DX to date is PY5BYE T77Q, with over 40 other stations having been worked."

Now a letter from Greece, where Demetre Valaris seems to be extremely active.

"I am writing to tell you a few things for your column. I have been a member of BATC for nearly a year now and am very pleased. I have built the G3WCY and G4ENA system (with three memories) and have had many fine video QSOs with BATC members on 20 metres. Mostly with Dick G4RRX from Norwich but also with G3WW, G4TUK, G4TBQ, G3INZ, G4PFG, G4UKL, G3WIL, G4RVC and G0BDD. I am in touch nearly every niht with DL1HBN and SP44KM. You see signals are stronger from Germany over here than the British. I have also worked with many other Europeans and my furthest SSTV up to now is WD0FNL in Minnesota.

"SSTV activity is rather low in Greece for the time being. I just know SV1OJ, SV1IY and SV9ADT/1; the first is working with an old Robot and the others with computers. I recently got the G1FTU tx/rx program and I am very impressed with it. I use it mainly for captions but I also use it for two-way 16 and 32 second pictures. I pinch pictures from Spectrum games such as Samantha Fox Strip Poker (hi hi!) and transmit them in high-resolution mode for 32 seconds. I have worked in 32 with SM6RKU Bob, who is British, DL1HBN and SP4KM. The above program has a nice real-time writing facility from the keyboard.

I wonder if any BATC members had any success with the 16 or 32 seconds transmit and receive using the G4ENA/G3WCY system. Any info would be much appreciated. I am on the air most afternoons and would be glad to contact more BATC members. Next time I hope to tell you more news. Do you know the proper reporting format for SSTV - perhaps RSV? If so, what is the maximum for V?"

If anyone knows, please drop me a line or tell Demetre - he lives at 24 Grigoriou E' Str, GR 16231 BYRON-ATHENS, Greece.

BR BUYS BR

The enigmatic heading means that Bob Robson GW8AGI has enhanced his home studio with a camera suite bought from British Rail. At this year's Crick extravaganza Ted G6CTV brought along some redundant studio equipment from British Transport Films, all of which went to good homes in the end. Ted also sold his colour camera, which will give him a dillemma over what to spend the cash on - or perhaps it won't!

Dave G8GKQ says Swaffham, where he lives, is a bit of an ATV desert, but he tries to maintain a sked on 70cm every week with Ian G4VTD in south London. Most weeks the pictures get through, with just 10 watts peak sync power at each end. Nick Harrold G4IMO is -not- on the air at the moment because high winds 'did for' his antenna mast. Until the insurance loss adjuster comes to inspect the damage he cannot do much from home. He has been trying low-power 24cm mobile TV with an F3YX-type outfit. Despite the low power level (around half a watt), results are distinctly encouraging. Martello, by the way, has left its old site for one on the north side of the River Crouch and is causing a little aggro on 24 from time to time. According to Chris G4HCL, and I suppose he ought to know, the Cambridge television repeater has already been finished and potential users await the big day with baited breath (especially if they get the kilowatt ERP they want!).

And now a query from Jerry G4GGL, who hails from Aldershot. He bought one of the Saba SECAM-PAL transcoder modules from Garex at one of the rallies. These assemblies were intended to fit in PAL television receivers, but Jerry would like to build the module into a standalone unit. Has anyone achieved this, and if so, how?

TO THE WILDS OF WALES

A letter from Ron G4HSC advises that the G8LIR contest group is hoping to arrange a mini-expedition to the Welsh mountains this summer when, among other things, they hope to swap pictures with continental stations on 70 and 24 cm. Due to the sporadic nature of ATV activity between contests (who says?!?) Ron wondered if it would make more sense to try and arrange skeds. It would but fixing schedules is not especially easy as most ATVers seem to be rather unorganised folk - even getting a QSL for a DX contact is often well-nigh impossible! All the same it might be worth writing to the ATV club secretaries in each country - only Germany and Switzerland have ATV clubs, and their 'top teams' speak only German (as we know from EATWG meetings). In other countries (Belgium, Holland and Austria) there are ATV managers who act on behalf of their national radio clubs. France has no ATV organisation yet, though it is hoped that an ATV club will be formed soon. Note that it is essential to enclose an international reply coupon if you expect a reply.

Failing any skeds, though, the best thing is to put out a call on two metres. As most folk know, there are two calling frequencies for ATV, 144.75 MHz FM and 144.17 MHz SSB. The latter is widely used in France, where 144.75 is a repeater input frequency and is generally avoided by ATVers. Usually calling on one of these frequencies produces results, especially on a Sunday morning, which is an activity time for many ATVers.

RECORDS

Anyway, we wish the group luck with their expedition in August and I hope they'll drop us a line if they have any success. Ron indicated they hoped to make some DX contacts and wondered what the best DX records were. For ATV these don't seem to be written down formally anywhere, but to the best of my ten years' knowledge they are as follows:

70cm

Best DX from UK: G4EGC Sheffield - DK3NZ FM44e (835 km), October 1975.

Best DX in Europe: EA1CR - F3YX (verified)
EA1CR - Ryn Muntjewerff (SWL) in Beemster, Netherlands (not verified whether he was seeing EA1CR direct or a retransmission of F3YX's recording).

24cm

G3YQC Rugby and G8VBC Burton - F1EDM Le Havre, 23.1 1983.

G8PTH Northampton - PE1DWQ, 25.8.1984.

No DX claims have been noted on the Continent, though the Germans regularly work France, Holland and Austria.

REPEATER NEWS

Perhaps the G8LIR group will be the first from Britain to see LX0ATV, a TV transponder and beacon co-sited with LX1GR at Rumelange in Luxemburg. The input frequency is 1252.5 MHz FM and the output is on 70cm (434.25 MHz vision and 439.75 MHz sound). Between 2200 and 2400 local time it operates as a beacon, so this might be the best time to look for it. In charge of the device is Rob LX1CR. Thanks to Kris Partridge G8AUU for this info, which will be incorporated in the new edition of the International Repeater Guide, which Kris helps compile.

In Bristol the GB3ZZ repeater received its licence on 30th April and was due to be switched on ceremonially on 2nd June. Roger G4ZQF, who is chairman of the repeater group, say they are doing their best to get maximum local publicity for the event. He wants to pay tribute to the assistance received from the BATC and the RSGB Repeater Management Group for helping get the licence so quickly and successfully.

The Brighton video repeater group people have a clever gadget for a new development. This is a combined microphone and 'touch-tone' keypad which is intended to control antenna beam alignment and a remote-controlled camera at the repeater site. This sounds fascinating and I look forward to telling you more about it in future. Moving north, the Dunstable Downs repeater GB3TV went high-power during the last week of May and now puts out the full legal ERP.

The Rugby repeater GB3RT has been on full power test in manual-control mode: it was rather weak at Northampton owing to the lie of the intervening land but good reports have been received elsewhere in the West Midlands.

At High Wycombe the GB3HV repeater is now on the air in beacon mode. It will be made fully operational once engineering tests are completed; so far the signs are good. Ian G4VTD located near Croydon is 55km from GB3HV but manages to get an excellent signal, so he considers the machine a great success. He thanks Garry G4CRJ and all the others who have put in so much work on the project. The repeater is used under manual control from time to time and so far Ian has seen Mike G6GIF, Chris G1FEF, Lewis G6HVQ, Mike G8LES and Garry G4CRJ through the box. All pictures were P3/P4 and in colour (except G1GIF).

TUT, TUT ...

Just in case you didn't see this in the papers, Britain's first satellite pirate has been brought to book. Raymond Starkey of Huddersfield recorded films received on his home satellite terminal, and then rented and sold these to his friends. He was prosecuted and fined £2000, and in addition he had to pay £200 costs as well as having his dish and all his video recording equipment confiscated. The new owners are the Federation Against Copyright Theft, who are taking an active role tracking down people who steal movies intended for cable stations and sell them for gain.

SIGNOFF

That's it for this time: not much on 70cm was there? For once the SSTVers have shown up the rest of you, so let's have plenty of reports from all ATVers in time for the next issue. Send them to me at 71 Falcutt Way, Northampton, NN2 8PH - thanks!

THE BRITISH AMATEUR TELEVISION CLUB

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER 1986

INCOME

Subscriptions	10,382.99	8,657
Members Services	135.34	2,159
Publications	1,932.78	2,318
Advertising	501.00	238
Building Society Interest	683.19	794
Miscellaneous	64.70	49
Exhibitions	749.50	208
Donations	200.10	109
Postages	800.77	909
	15,450.37	15,441

EXPENDITURE

CQ.TV Printing	6,356.74		5,561	
CQ.TV Postage	2,809.86		2,525	
General Office Expenses	822.31		722	
General Postages	1,244.25		1,193	
RSGB affiliation fee	9.90		10	
Committee members expenses	377.60		95	
Exhibitions and advertising	836.04		1,267	
Insurance and Awards	299.99		261	
Depreciation	399.07		3,097	
Prestel and Hot Line	32.32		29	
Accountancy	172.50		138	
E.A.T.W.G.	1,000.00		-	
Adverts.	104.08		-	
		14,464.66		14,898
EXCESS OF INCOME OVER EXPENDITURE FOR THE YEAR £		985.71		543

BALANCE SHEET AT 31st DECEMBER 1986

FIXED ASSETS		
Office Machinery		
Additions	399.07	
Less: Depreciation	399.07	
CURRENT ASSETS		
Stocks - members services	2,800.00	
- publications	2,928.77	
Debtors	-	
Midshires Building Society - deposit account	17,059.47	
Lloyds Bank plc. - current account	226.75	
Cash	100.00	23,114.99
Less:		
CURRENT LIABILITIES		
Creditors and accrued charges	1,172.50	
Subscriptions received in advance	5,500.95	6,673.45
Represented by:	£	16,441.54
ACCUMULATED FUND		
Balance brought forward		15,455.83
Add:		985.71
Surplus of income over expenditure for the year	£	16,441.54

We have prepared the above Balance Sheet as at 31st December 1985 together with Income and expenditure Account for the year ended 31st December 1985 and certify them to be in accordance with the books, records and information supplied to us.

SWADLINCOTE
27.4.87.

CHARTERED ACCOUNTANTS

W&D 24CM POWER AMPLIFIER REVIEWED

By John Wood G3YQC

The 1250FM15 is a broadband 24cm power amplifier specifically designed to boost the output of the 1240TVT 24cm FM-TV source. The circuitry utilises the latest design modular amplifier in the final stages with two discrete semiconductor linear driver amplifiers. The unit will typically produce in excess of 18 Watts RF output for a drive of only 20mW (+13dBm).

MANUFACTURER'S SPECIFICATIONS

Bandwidth	1200MHz to 1350MHz
Power gain	29dB (typical)
Maximum drive	20mW (+13dBm)
Power requirements	12v d.c. @ 5 Amps

The photograph shows the general appearance of the amplifier. It is very well constructed and, because of its large heatsink, is well capable of dissipating the considerable amount of heat which is generated under normal operational conditions. 50-ohm 'N' type coax sockets are used for RF input/output and DC power is applied via a multi-way latching connector (plug supplied). A 'power-on' lamp is also fitted.

Tests were carried out using a calibrated Bird 43 wattmeter, a precision dummy load, a Racal 9087 UHF signal generator and a Hewlett Packard 8559A spectrum analyser. Unfortunately only a fixed 13.5v PSU was available at the time so this was used for the tests.

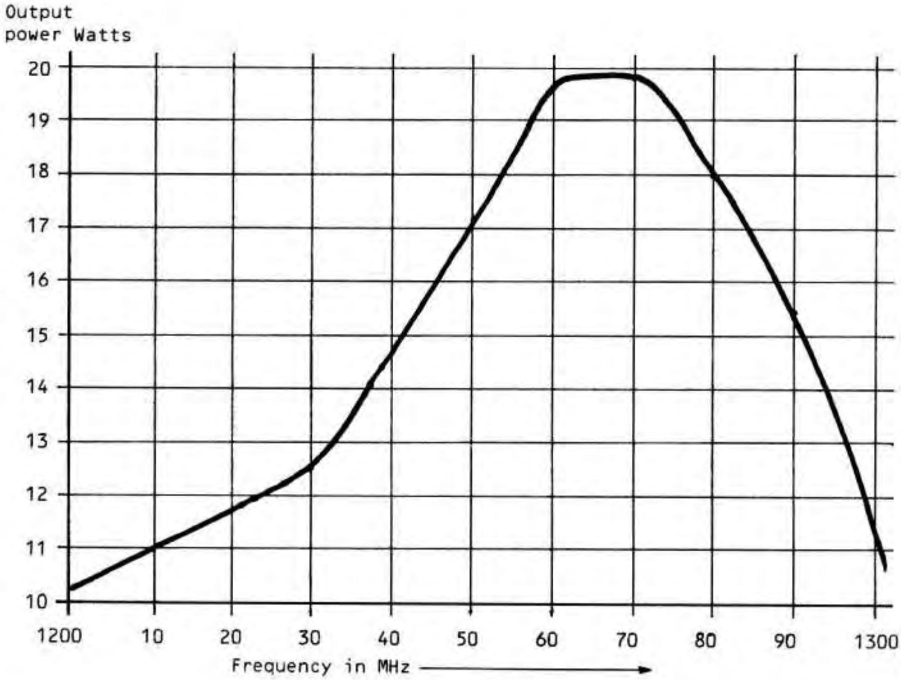
The graph shows a plot of frequency against power output down to the 3dB points. At first glance it may seem a bit 'peaky' but remember a drop of 10W, say from 1260 to 1200MHz, represents only a 3dB reduction which is a good performance at these frequencies, especially since conventional striplines are used in the drivers. You can see that almost 20W was achieved at the optimum frequency and the 1dB bandwidth was a respectable 35MHz. This sort of performance is almost ideal for ATV working and will allow operation for example on 1249MHz (repeater inputs) whilst still holding its performance if you shift up the band to a simplex channel. Its use in an ATV repeater station will mean full power out with a relatively simple transmitter design. The amplifier was left on 'soak' test at full output for 12-hours without any noticeable change in performance and the heatsink, although somewhat warm, was by no means hot.

Varying levels of drive were applied and it was nice to see that the power gain remained more or less constant between about 2 and 20W out. Unconditional stability was observed at all times and no measurable unwanted products could be found which were attributable to the amplifier under test.

Wood & Douglas do say that the unit can be used under linear (SSB) conditions, in which case the drive level should be reduced so as to provide about 10W output.

The review unit was tried as supplied and no attempt was made to re-tune it. Nevertheless I feel sure that the performance would remain essentially constant over the specified frequency range.

The amplifier is not cheap. It was offered at the BATC show for £250, but customers should check the current price before ordering. However, for a unit of such performance and, considering the degree of mechanical engineering involved and the expensive devices used, I feel that it is good value for money - recommended.



1250FM15 FREQUENCY RESPONSE CURVE

My thanks to Wood & Douglas for loaning an amplifier for this review.

THE SCART CONNECTOR

Following several requests from members wishing to know more about the intricacies of the SCART connector, we have scanned the available literature and hope that the following may be of some assistance.

The system has several names: Peritel (peripheral equipment to television), SCART (after the committee which designed it) and Euroconnector. Briefly it is a serious attempt at standardisation of the various connections required between such items as televisions, video equipment, audio equipment, computers, remote control, cable TV etc. The idea is that the whole house can be wired according to the SCART system and the various pieces of equipment linked together by simply plugging in to room sockets.

There have been several articles detailing the pin-out of the connector, however, for those who are not yet familiar with it the details are given in Fig.1. An attempt has been made here to describe the various pin functions in more detail than that normally supplied with (say) a SCART plug. Also, what is often not detailed are the nominal signal levels and impedances required, so we have listed these in table-1.

From a study of Fig.1 you will see that the function of most of the pins is obvious. There are however one or two which are not and it is these about which we shall concern ourselves here.

SCART PIN ASSIGNMENT

1. Audio out (right-hand channel)
2. Audio in (right-hand channel)
3. Audio out (left-hand channel)
4. Ground for audio channels
5. Blue video channel ground
6. Audio in (mono or left-hand channel)
7. Blue video channel input
8. Source switching, ie TV/monitor status
9. Green channel ground
10. Remote control (inverted) or clock
11. Green channel input
12. Remote control
13. Red channel ground
14. Ground for remote control channel
15. Red channel input
16. TV/non-TV status (RGB fast blanking)
17. Ground for composite video
18. Ground for TV/non-TV status
19. Composite video output
20. Composite video input OR sync for RGB signals
21. Socket earth (plug shield)

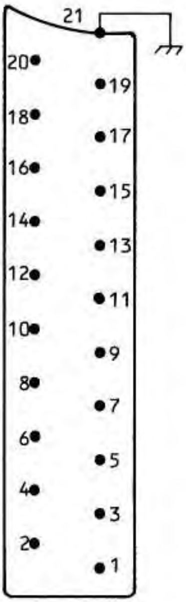


Fig.1

Pin-8. The voltage applied to this pin determines the status of a TV/monitor set. From table-1 you can see that 0-2v (ground) indicates that the monitor part of the set is inactive (during TV reception), whilst 10-12v is used to operate the set as a monitor.

Pin-10 is a remote control (inverted) intercom line, or it can be used for a clock. (To be honest I can't really find any sensible information on the use of this pin - ED).

Pin-12, this is also a remote control intercom line but appears not to support the 'clock' facility.

NOMINAL SIGNAL LEVELS

Composite video:	1v p-p into 75-ohms
RGB video:	0.7v into 75-ohms
Audio in:	500mV into 10k
Audio out:	500mV into 1k
TV/monitor status:	Inactive (during TV reception) 0-2v. Active (TV used as monitor) 10-12v into 12k
External fast blanking input:	Inactive (during TV reception) 0-0.4v. Active (TV used for anything else) 1-3v

Table-1

Pin-14 is simply a common ground point for the screened leads to pins 10 and 12.

Pin-16. This pin requires a 0-0.4v DC level to indicate that a TV set is being used for ordinary reception, whereas 1-3v DC is required to use the TV for anything else.

Pin-18. This is a ground connection associated with the lead to pin-16.

Most of the printed pin-out lists for the SCART connector specifies CVBS for pins 17, 19 and 20. This simply means Colour Video, Blanking with Sync. In other words: ordinary composite video at a standard 1v p-p across 75-ohms.

It should also be noted that RGB signals from computers are often at TTL levels (0-5v) which is too much for monitors comlying with the SCART standard. In this case a simple resistive potential divider, such as the one shown in Fig.2, should be wired into each of the three lines. This will then provide signals of around 0.7v.

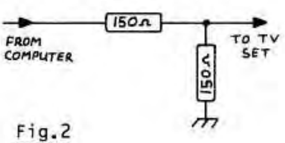


Fig.2

The Editor would be interested to hear from anyone with additional information on the SCART system.

REFERENCES:

'Plug Into Peritel' by Andy Emmerson, G8PTH, R&EW October 1986.

'Problems with Peritel' by Harold Peters, Television March 1985.

PRESTEL/VIEWDATA EQUIPMENT

FOR DISPOSAL - SPECIAL OFFER TO B.A.T.C. MEMBERS.

Make/Model	Description	Price
STC Novatel 35E	7" Mono Prestel Terminal	£12.00
TANDATA-TD1100	Prestel Adaptor	£40.00
ALPHA TANTEL	Prestel Adaptor	£25.00
TANTEL	Prestel Adaptor	£20.00
ZYCOR 2000	Prestel Adaptor	£35.00
ZYCOR 5000	Prestel Adaptor Exec. case	£45.00
ACE TELECOMM	Prestel Adaptor	£40.00
BARCO CRV2032	20" Col. TV/Monitor/ Prestel Term. Incomplete	£30.00
BARCO 761100	Heavy Duty Wired Keypad (free with CRV2032)	£2.00
CHERRY UB80FS	Edit KeyboardFixed speed	£18.00
CHERRY UB80MS	Edit KeyboardMulti-speed	£22.00
SONY KI-101	Edit Keyboard Cherry	£22.00
PHILLIPS 1040	Viewdata Printer-Centronics	£25.00
Acoustic Coupler		£5.00
SONY KTX1400	14" Col. Terminal	£150.00
SONY RM603	Num Keypad (Free with KTX 1400)	£8.00
PHILLIPS 3605	14" Col. Terminal	£175.00
DECCAFAX VP1	Viewdata Plinth	£15.00
DECCAFAX VP2	Viewdata Plinth	£15.00
OTHER ITEMS		
SONY VTX100	Profeel Tuner Unit Video/Audio Unit Ex-demo	£120.00
SONY TXT100	Profeel Teletex Decoder Module Ex-demo	£55.00

Terminals have mains isolation.Terminals ideal for monitor use (some require mods) Values exclusive of VAT and carriage.Quantities to be confirmed at time of enquiry. Discount for quantity.All items sold without warranty and not guaranteed working. All items subject to availability.Technical info supplied on demand, where available.

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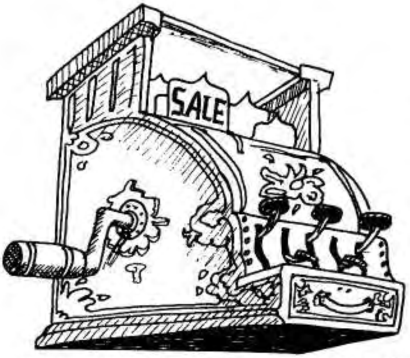

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Full page - inside - £30.00
Smaller displays - proportional

*Advertisements are placed in this column free of charge to paid-up members. Addresses will be included with adverts unless requested otherwise.
All ad's should be sent to the Editor at 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: (0788) 69447 before 20th September.

- FOR SALE -

EX-BBC EQUIPMENT: VIDEO distribution amplifier, 6 outputs, one monitor output, one input, built-in power supply, just needs mains and off it goes! These units are for mounting in a crate (8 D.A's per grate) which in turn mounts in a 19" rack. Will sell separate from the crate but with the backplate connector for each unit. The backplate has MUSA sockets and a Bulgin 3-pin for mains...£10 per D.A. including backplate, data, circuits, instructions £1 for photocopying. Post £3 per D.A. or collection by arrangement. 8 D.A's in a crate with data and circuits...£80 if collected or delivered for £95.
Ken Bailey, 40 Seymour Close, Selly Park, Birmingham B29 7JD Tel: (021 472) 3688

SATELLITE/MICROWAVE ATV DISHES: 1.2m offset elliptical fibreglass, complete with polar mount and head assembly tripod...£90. ALSO 1.2m prime focus fibreglass dish, complete with el/az mount and head assembly tripod...£90. Prices subject to offers although proceeds over a certain amount will go to the GB3RT ATV repeater project.
Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF. Tel: (0788) 890365.

SOME VEGA TV SPARES available, limited to I.F. panels, tuners and associated I.F. amplifiers, some controls etc. No LOPT's or time base panels but lots of small spares such as transistors. A SAE with enquiry will get reply by return.
J.Brown G8LPB, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS

RIGONDA SPARES. The address for all your Rigonda spares is:- Rigonda Supplies, 10 Lakehouse Road, London E11 3QS Please enclose a stamped addressed envelope with enquiries.

WOOD & DOUGLAS 24cm 1250DC50 down converter...£62. VIDIF processor/demodulator board...£50. SCR-2 receive sound demodulator...£12. VD/P1 pre-emphasis/de-emphasis module...£7.
Paul Chamberlain G4XHF, 9 Goffs Close, Southgate, Crawley, West Sussex RH11 8QB. Tel: (0293) 515201

SATELLITE 1.5m GRP offset dish (44dB gain), polar mount and stand, SPC LNB 2.1dB (typ) noise figure with 52dB (min) gain...£250.
John Turner G6MEH, 44b Foxgrove Road, Beckenham, kent BR3 2DB. Tel: (01 658) 3690.

YAESU FT790R all-mode 70cm transceiver for sale. Covers 430 - 439.99MHz in 100Hz or 1KHz steps (SSB/CW) or 25 or 100KHz steps (FM). 1W out, memory, scanning, 2 VFO's etc. Has aerial socket fitted to rear (front socket retained)...£250. ALINCO ELH-730G 30W linear amplifier, no RX pre-amp...£50. Both about three years old but little used. 10GHz PRECISION glass vane attenuator by W.H.Sanders Ltd; micrometer head, WG16 waveguide, round flanges (with rings), in lined box and in perfect condition...£30. ELLIOTT 10GHz precision RF short; micrometer head type A, WH16 waveguide, square flange. In excellent condition this is believed to be still a current item...£15. 10GHz TUNABLE CRYSTAL DETECTOR MOUNT, two micrometer heads (frequency and coupling), round flanges, complete in wooden box and checked through a microwave lab...£20.
John Wood, G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU Tel: (0788) 69447 (evenings/weekends).

70cm 10-Watt AM-TV transceiver, Wood & Douglas with video filter, boxed and in full working order...£100. 70cm 19-ELEMENT Tonna...£12. 23cm 28-element quad loop Yagi aerial...£15. 23/24cm 37-element quad loop aerial...£16. SONY VIDEO RECORDER model AV3620CE with 3 LP tapes...£35. EX-SURVEILLANCE CAMERAS, 12v model CTC2100, with 16mm 1:1.6 lens and automatic EE lens...£45. SONY AVC3000CE, 240v excluding lens...£30. CANON TV zoom lens, 15x15 15-75mm 1:2.1, C-mount...£65.
Keith Miles G1OTO, 99 Kenrick Road, Mapperley, Nottingham NG3 6EZ. Tel: (0602) 503312.

SERVICE MANUALS for Shibaden VM-903 video monitor and Sony HVC-3000P colour camera (photocopy) available (only one of each). Send £1 to:
John Wood G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: (0788) 69447.

CRT type AW17-20 for camera viewfinder, monitor, etc...£5. MONOCHROME processing amplifier, complete with power supply, in smart 19" rack mount case...£10. SET OF SCAN COILS for 30mm plumbicon tube...£5. All items buyer collect or pay carriage.
Peter Delaney G8KZG, 6,East View Close, Wargrave, Berkshire.RG10 8BJ. Tel (073522) 3121.

A QUANTITY OF SONY VC500 MONOCHROME TV CAMERAS for sale. Brand new in sealed boxes and consisting of: 6:1 f1.3 Canon zoom lens, 2/3" Vidicon with built-in 1" viewfinder, 2-metres of cable with 10-pin plug. To operate these require 12v DC, line drive, field drive - neg 4v pulses. Circuit diagrams available...£75 each or £130 for two.
H.R.Skelhorn, G8BPU, Rands Video Ltd., Video House, 10 Hibel Road, Macclesfield, Cheshire SK10 2AB. Tel: (0625) 26248.

EDL 70cm linear amplifier...£65.
D.R.Higginson, G8JET, 28 High Street, Misterton, Doncaster, South Yorks DN10 4BU Tel: (0427) 890768

ASTEC TVRO RECEIVER MODULES: Tuner AT1020 and IF/demodulator AT3010. New and unused, half price at £45 for the pair.
Terry Bond, 2 Broadlands, Keighley, Yorkshire BD20 6HX. Tel: (0535) 664154.

23,70 & 32cm GEAR FOR SALE:
* LMW solid-state PA, approx. 8/9W out. £50.
* EME (German) twin-2C39 tube PA, 150W out, with blower, 'official' power supply, V and A meters, etc. Very smartly finished in Radiospares instrument case. With spare tubes, not heavily used. Superb machine, wicked price new, which means my price of £275 o.n.o. represents a considerable discount.
* LMW bipolar preamp (not masthead), in black diecast box with BNCs, £15.
* EME (German) high-spec coaxial relay, mounted on diecast box, £40.
* Fortop 24 cm FM-TV transmitter, 1249 and 1255 MHz, 1.5W out. £120.
* Wood & Douglas 24 cm FM-TV sound and vision receiver, £100.
* Fortop 70 cm TV transmitter, 10W output, crystalled 435 & 438.5 MHz. £100.
* Microwave Modules 70 cm ATV converter, Band I output. £20.
* Clarion JC-10 933-935 MHz personal radio system transceiver, 5W FM. With accessories, £200.
* All the above equipment is in virtually as-new condition and guaranteed working. Andy Emmerson G8PTH/G9BUP, Northampton 0604-844130.
* AUDIO TAPE OF BRITISH TV STATION IDENTS - BBC, many defunct ITV stations, etc, etc. Supplied on quality C-60 cassette with notes, for £5 post paid. Money back if not satisfied! Please allow two weeks for delivery. Send now to Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. (Video tape of test cards should be ready later this year ...)
* 35 mm MONOCHROME SLIDE SCANNER, based loosely on EVR machine. Was working but needs complete rebuild (which I shall never get round to!). All parts and data supplied but this is not a task to underestimate. Fairly large, no guarantee, buyer to collect. Apart from that, it is capable of very high quality output. Free to good home. Andy Emmerson,G8PTH Tel: (0604) 844130.

PYE Mk8 Plumbicon caption camera, with CCU, PSU, cable, lens, remote control panel, circuits. As removed from an O.B. van...£35. ZOOM LENS; 10:1, 'C' mount, power operated, fits above camera...£45 or £35 if purchased with camera. COX BOX. Early Cox Box (caption colouriser), including circuits, mono in, RGB out...£30. B/W CHROMA KEY unit...£10 no details. PULSE DA's, 8 in BBC frame ex O.B. van and working, with circuit...£20. PLUMBICONS 1.25" I/mesh...£10 each. PHILIPS N1700 various and spares...cheap! LARGE FLAT BED trailer, 3.5tons gross, 4-wheels...£500. SPOOL 1" C-format video tape...£5. FISH AND POULTRY BUSINESS, located Gainsborough market hall...cheap (POA). APPLE II computer cards, speech gen and software...£25, 80-column card (duff)...£5, Numeric keypad (duff)...£10, database software for hard disk system...£10, PRODOS master disc...£10, PAL card...£20, RGB card (duff)...£5. LAMPS, box of 12, 115v 200W floods, ES bases...£6. CONSTANT VOLTAGE transformer, 150W in 19" rach frame, fused, 13A socket...£10. PYE Mk6 CAMERA, including: CCU, PSU, control panel, 4.5" I.O.tube, 4-turret lens, cables (but not Mk4 cable), spares...£75. PIR LANDROVER vibration damped seats...£20.
Tel: G8MJW on (0522) 703348 or Brian Summers, G8GQS on 01-998-4739.

- WANTED -

A PHOTOCOPY or the loan of a manual for a Philips V100 monochrome camera. In particular the circuit diagram of the camera and control box.
Brian Robinson G6ZTD, 23 Croft Drive, Millhouse Green, Sheffield, S30 6NE.
Tel: (0226) 763033

VIEWFINDER for a Sharp XC34 colour camera wanted. Working or not but should be complete. Would also consider complete camera if price is OK.
John Carney G8JHM, 39 Blenheim Crescent, Luton, Beds LU3 1HB

VINTAGE 405-LINE COLLECTOR urgently requires a good 405-line signal source. Monoscope, pattern generator etc. Also MARCONI 819 picture monitors, manual for a Peto Scott (Philips) EL3400A 405-line 1" video tape recorder, early TV sets, books, magazines, advertising material etc. All 405-line video recordings (any system), anything old considered.
Bill Journeaux, 7 Blair Avenue, Poole, Dorset BH14 0DA. Tel: (0202) 748072.

PAST ISSUES OF CQ-TV MAGAZINE wanted for private collection. All issues prior to No.123. Also 'TELEVISION' magazines prior to 1983 wanted urgently. Good prices paid.
David Norrell, 51 Cairngorm Walk, Larne, Co.Antrim, Northern Ireland BT40 2JP.

I AM INTERESTED in obtaining broadcast TV cameras for my collection. The gap-fillers I especially require are Marconi Mk1, 2 & 4, Pye Pesticon, high-velocity Emitron and CPS Emitron. Please telephone during normal working hours on 01-898-0011 ext.3273 or at home on 01-979-4193 if you feel you have anything that might suit.
Bob Warren, 90 Tudor Road, Hampton, Middlesex TW12 2NF.

ASTEC UM1233 RF modulators wanted, similar to those in the Sinclair ZX81, a scrap micro would be OK.
J.Brown G8LPB, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS

HANDBOOK/CIRCUIT DIAGRAM for Heathkit FM stereo generator model IG-112. All expenses paid.
D.W.Harbour G0EID, 20 Durkins Road, East Grinstead, West Sussex RH19 2ER.
Tel: (0342) 25162

24cm ATV station wanted. AM/FM, have video camera etc need transmitter, aerial, receiver etc. ALSO COMMODORE programmes for exchange and wanted, RTTY SSTV etc.
David Tilley G1UEF, 55 Jenner Road, London N16 7RB Tel: 01 806 0872

ANY INFORMATION on Sony HST-49A stereo cassette receiver/programme sensor, can photo copy and return.
James McNab GM2COI, 166 Kingswood Drive, Glasgow G44 4RB.

INSTRUCTION MANUAL and channel change button (No.5) for a Philips N1501/15 VCR wanted, also AN7150 i.c.
Andie Wilkes G4NTV, 34 Tideswell Road, Great Barr, Birmingham B42 2DT. Tel: (021 357) 2700.

CIRCUITS OR MANUALS for Sony AVC3000CE and Sony VCK-2400ACE video cameras. Will pay copy costs, postage and a reasonable fee for photocopying if you don't want to part with the original.
Paul Bruckel, G8FNA, Old Smithy, Morwenstow, Bude, Cornwall EX23 9SG. Tel: (028 883) 522.

HITACHI HV-30S, EUMIG 556 and JVC CV-5001 camera circuits, handbooks etc wanted urgently for same which I have acquiredas non-working units.
Geoff Grayer G3NAQ, "Bagatelle", Southend, Brightwalton, Newbury, Berkshire RG16 0BE

HANDBOOK FOR SOLARTRON CD1400 'scope wanted to buy or loan and returned next post. Did I see one at the bring-and-buy at Crick? All expenses paid.
Mike Berry G1LWX, 133 Rectory Road, Ashton-in-Makerfield, Nr.Wigan, Lancs. Tel: (0942) 720115.

TWO LEKTROKIT rack members LKR5111, and two connectors LKR5121 - also matching 1/4 UNF captive nuts and screws.
Peter Delaney G8KZG, 6,East View Close, Wargrave, Berkshire.RG10 8BJ. Tel (073522) 3121.

NTSC MONITOR wanted, almost any (repairable) condition? I have an American standard MSX computer which appears not to be convertable to PAL.
John Brown G3LPB, 45 Marlborough Avenue, Falmouth, Cornwall.

ANY 405-LINE equipment; receivers, signal sources etc. EARLY BROADCAST radio receivers, commercial or home-brew.
D.R.Higginson, G8JET, 28 High Street, Misterton, Doncaster, South Yorks DN10 4BU Tel: (0427) 890768

FERGUSON 3V24 portable VCR wanted. Will consider a non-worker if it is in reasonable physical condition.
George Mayo, G4EUF, 'Carlton House', Broad Lane, Markfield, Leicestershire LE6 0TB. Tel: (0530) 242378.

MAINS CABLE; long length of armoured for burying, 30/40A. CRT's for Marconi Mk5 PWM. PYE 11" monitor. U-Matic recorder with CAPSTAN servo, Sony 2850? EMI valve SPG, for collection (green case style). MARCONI Mk7 SPG. LENS for Marconi Mk8 camera.
Tel: G8MJW on (0522) 703348 or Brian Summers, G8GQS on 01-998-4739.

HF TRANSCEIVER wanted. Cash is a little short so no fancy jobs please! A transceiver which has seen a good bit of use over several years but is still in decent order is probably what I am looking for. Re-alignment and/or minor faults would probably be acceptable.
Keith Johnson, G0HRM, 7 Oak Cottages, Street Ashton, Stretton-under-Fosse, Nr. Rugby CV23 0PH. Tel: (0788) 832115.

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